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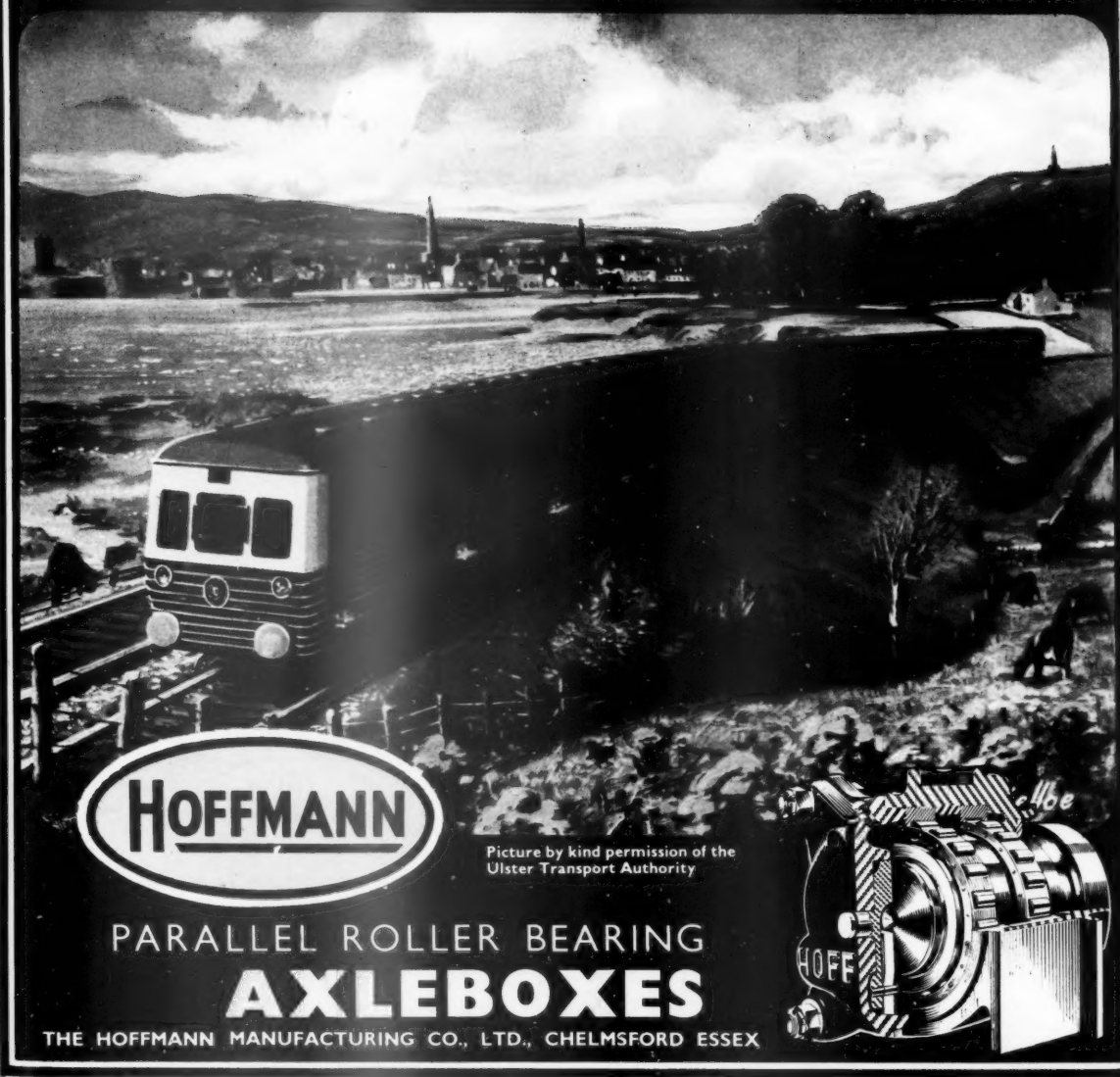

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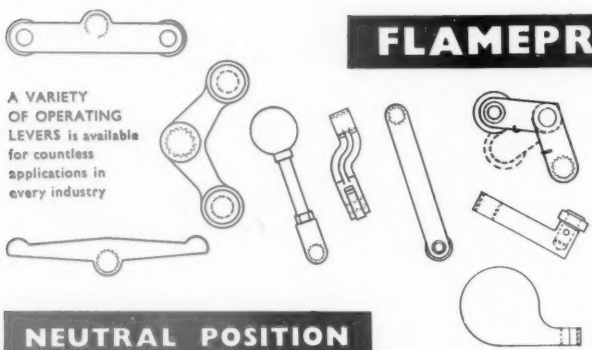

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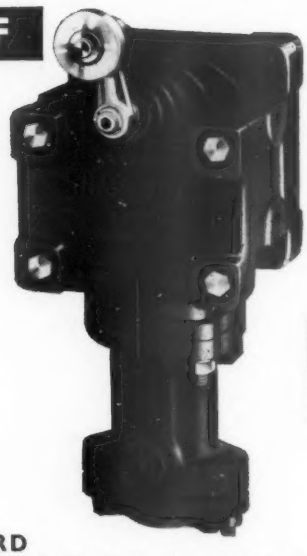

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THE RAILWAY GAZETTE
A Journal of Management, Engineering and Operation
INCORPORATING
The Railway Engineer · TRANSPORT · The Railway News
The Railway Times · Herapath's Railway Journal · The Railway Record.
Railways Illustrated · ESTABLISHED 1835 · The Railway Official Gazette

33, TOTHILL STREET, WESTMINSTER, LONDON, S.W.1.
Telephone : WHItehall 9233 (12 lines) *Telegrams : "Trazette Parl, London"*
BRANCH OFFICES
GLASGOW: 139, Bothwell Street, C.2 . . . . . *Central 4646*
NEWCASTLE-ON-TYNE: 21, Mosley Street . . *Newcastle-on-Tyne 22239*
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LEEDS: 70, Albion Street . . . . . *Leeds 27174*
BRISTOL: 8, Upper Berkeley Place, Clifton . . . . *Bristol 21930*
Annually £5 by post. Single copies, Two shillings.
Registered at the G.P.O. as a newspaper. Entered as second-class matter in U.S.A.

Editor : B. W. C. Cooke, Assoc. Inst. T.

Vol. 107] FRIDAY, OCTOBER 11, 1957 [No. 15

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Manning of Diesel and Electric Locomotives

THE real interest of the footplatemen concerned in the question of manning British Railways diesel and electric locomotives is to agree in principle to one man only in the cab. Discussions have been in progress this week between the British Transport Commission and the Associated Society of Locomotive Engineers & Firemen and the National Union of Railwaymen; it is to be hoped that the union representatives will recognise the advantages to their members of an arrangement which benefits all parties concerned. From the management point of view single manning has obvious advantages. From the aspects of both safety and the strain on the driver, ample precedent exists on British Railways in the numerous fast and heavy multiple-unit electric passenger trains driven by one motorman. The use over a good many years of diesel shunting locomotives manned by one driver shows that no undue strain is involved, at least for slower diesel-hauled trains. Conditions in other countries, where, amongst other things, runs tend to be longer, do not apply in Britain. There is moreover a shortage of trained enginemen when many diesel and, later, electric locomotives are about to be placed in service. Even with the diesel and electric training facilities now available, or to be made available shortly, the number of men trained to handle diesel and 50-cycle electric locomotives will be none too great. To have two such men on each locomotive would be a waste. This should be carefully considered by the unions. The A.S.L.E.F. especially seems to have been haunted by needless fears of redundancy. One man on each engine increases productivity, and the Commission has pointed out on several occasions that such increases can only benefit the staff in due course. Here is a good case indeed. The one man in charge of a main-line diesel or electric locomotive will be a trained specialist, and can be expected, when circumstances eventually allow, to be rewarded accordingly, though this will take time. It is not too late to hope that the unions will be far-sighted.

British Columbia Trade Mission in Britain

A TRADE mission from British Columbia, headed by Mr. R. W. Bonner, Attorney-General & Minister of Industrial Development, Trade & Commerce, is now visiting Britain and the Continent. The mission, the fifth of its kind in recent years, is concerned with the promotion of two-way trade between the United Kingdom and the Province, and is also hoping to interest British manufacturers in the International Trade Fair to be held in Vancouver next May as part of the centennial celebrations. There is a feeling in British Columbia that manufacturers in this country are not taking the interest they should in this rapidly growing area, with its enormous resources of minerals, oil, and timber. To fill the gap, increasing activity is being shown by West German and other Continental interests. The Pacific Great Eastern Railway extension southwards to Vancouver was opened early this year and work is proceeding on the northern extension to Dawson Creek and Fort St. John, in the Peace River district. Both sections of line are being built with British rails. North of the Peace River district, it seems likely that an Alweg monorail will be built, for the Wenner-Gren interests have been showing great energy in surveying and mapping under their development agreement with the Province. The mission is to see the trial Alweg line near Cologne while in Europe, and Dr. Axel Wenner-Gren is reported to have declared his readiness to build an Alweg line as far north as required, if necessary into Alaska.

Machine Tool Orders Increased

FIGURES for the machine tool industry for July show that home orders increased from £4,560,000 in June to £5,510,000, the second highest level for the year. The March value was £5,550,000; and total orders for July, at £7,230,000, were the highest since March. Deliveries for July, however, amounted to £8,000,000, so that the rate of production again outstripped the flow of orders, reducing the order book to £89,130,000. The size of the order book has now fallen regularly for nearly a year as a result of increased production and in July there was work for some 10 months against existing orders. Regrettably, export orders remained at the same level as in June, and well below the level of the first four months of the year. There is a strong possibility, however, that the Machine Tool Exhibition in Hanover last month may have brought a welcome influx of orders from the Continent. The effect of the 7 per cent Bank rate on home orders will not be seen in the statistics for some time, but if this high rate continues for any length of time it must tend to reduce orders in the home market.

The Doncaster Tradition

THE announcement that the last steam locomotive to be built at the Doncaster Works of British Railways will be completed on October 16, as mentioned last week.

will be received with mixed feelings. There will be regrets that the long line of steam locomotives is to end. On the other hand discontinuance of steam building has for some time been recognised as an inevitable step in the complete conversion to more efficient, if less romantic, diesel haulage. The works was originally built in 1853 as repair shops for the Great Northern Railway and it has been concerned with steam locomotive engineering since 1867, when the first locomotive was turned out. Thenceforth, and through L.N.E.R. days it has been a main centre of locomotive construction. The number of locomotives constructed totals 2,228. Doncaster will always be associated with the names of four locomotive engineers, Sturrock, Patrick Stirling, Ivatt, and Gresley, and with such famous designs as the Ivatt Atlantics and the Gresley streamline Pacifics. It is to be hoped that the fine tradition of locomotive engineering which has been built up with steam will be maintained as the works becomes more closely associated with the construction of diesel locomotives.

Overseas Railway Traffics

OPERATING revenues of the Canadian National Railways for August amounted to $63,990,000. Expenses, taxes and rents totalled $64,262,000, resulting in a net operating income deficiency for the month of $272,000. In August, 1956, operating revenues were $69,534,000; expenses, taxes, and rents were $61,533,000, and the net operating income was $8,001,000. Canadian Pacific Railway revenues for the same month were $43,510,924 (against $47,156,645 for August, 1956) and railway expenses $40,138,697 ($42,525,116) so that net earnings were $3,372,227 ($4,631,529). Aggregate net earnings from January 1, were $21,564,520 ($23,781,630). East African Railways & Harbours approximate total railway revenue for the month of August was £1,500,000 compared with £1,479,000 in August, 1956, an increase of £21,698. This is the third consecutive month this year that revenue has been higher than the corresponding month of 1956. The total railway revenue for the first eight months of 1957 amounted to £11,452,000 compared with £11,633,000 for the same period of 1956, a decrease of 1·5 per cent, the greater part of which was attributable to the drop in receipts on the Central Line. Costa Rica Railway receipts for August were colones 1,963,003 compared with colones 1,765,782 for August, 1956, an increase of colones 197,221.

Longest Lift-Span Bridge

THE Baltimore & Ohio Railroad New York suburban subsidiary, the Staten Island Rapid Transit Railroad, serves that island and crosses the Arthur Kill channel to connect with the New Jersey railways. The bridge over this channel, a single-line structure, includes a swing-span opening constructed as long ago as 1887. Well over 100 vessels of one type or another use this channel on an average day, and the old swing span has become completely outdated. Consequently it is being replaced by a vertical-lift span, measuring 558 ft. between centres of bearings and providing a clear 500-ft. navigation channel between fenders. In the open position it will clear M.H.W. level by 135 ft. When completed this will be the longest lift-span in existence, and there will be some 2,000 tons of steelwork in the span itself and the lifting towers. It will form part of a bridge some 1,650 ft. in overall length with 13 concrete piers being built on an alignment passing 61 ft. north of the old swing span. As the latter continues in use, the lift-span will be fabricated elsewhere, floated to site and lifted to its full height to enable the arm of the swing span to revolve below it. As the foundations of one of the towers are being built in 35 ft. of water on solid rock with no overburden, the anchoring in a 4-6-knot tide provided special problems. These were solved by first anchoring a fender frame in which a sheet-piling cofferdam was sunk, and after 11 ft. of the rock had been excavated within it, the whole was filled with mass concrete.

Hydraulic Buffers for Rolling Stock

WITH the continuous increase in traffic density and shunting speeds, the limitations of the conventional spring buffer are making themselves apparent, and both wagon builders and wagon users will welcome the very considerable increase in the shock absorbing capacity of the hydraulic buffer, an example of which is described elsewhere in this issue. With the use of such a buffer, wagon structures can be appreciably lighter and the shock loading on freight correspondingly reduced. This is caused by the inherent characteristic of a rapid rise in impact resistance early in the buffer stroke, followed by a fairly constant resistance, proportioned to the speed of impact, over the remainder. An important feature of hump marshalling yard work is that buffing speeds can safely be increased from the spring buffer speed of 4 m.p.h. up to 10-12 m.p.h.; this allows a considerable margin of error in the estimation of distance run. A further point is that the objectionable surging of spring buffer wagons due to the high recoil speed is also eliminated by the use of hydraulic buffers, in which the impact energy is dissipated instead of stored.

Coaching Stock Weights

WHEN such close attention is being paid to every possible means of reducing the weight of coaching stock as is now the case in some other countries, the U.S.A. in particular, it seems a little surprising that the weight of British coaches still continues to rise. Standard corridor coaches today are certainly more lengthy than those of the 1930s, but from 30-32 tons to 33-35 tons per coach is an increase in weight more than proportionate to an increase in length of from 60 ft. to 63 ft. 6 in., and a modern kitchen car at 48 tons is out of all proportion to the 36 tons of a Southern Railway composite kitchen and restaurant car. With the current limitation in weight of many express trains to 300 tare tons, these differences are significant; they decide whether an express must be restricted to nine coaches or may be made up to 10. In this matter the Swiss Federal Railways set a notable example; their standard lightweight coaches, of admirable riding qualities, though 73 ft. long, weigh no more than 25-27 tons apiece, and this means that up to 11 bogies (including restaurant car and brake space), seating up to 650 passengers of both classes, can be marshalled within a tare limit of 300 tons. This fact, with the help of roller-bearing axleboxes, explains the ability of their Bo-Bo electric locomotives of 57 tons weight to handle the very fast lightweight Geneva-Zürich trains at speeds up to 80 m.p.h. on the level, and 60 m.p.h. up such gradients as the 1 in 55 eastbound out of Lausanne. The subject of coaching stock weights is receiving intensive study in Great Britain, however, and new developments in design may be expected.

Overrunning at Welwyn Garden City

LT.-COLONEL G. R. S. WILSON, who inquired into the accident near Welwyn Garden City on November 22, 1956, and whose report is summarised in this issue, was compelled to conclude that the signals were in proper order and passed unobserved. As at Harrow, a local train was being sent ahead of the express in accordance with recognised principles but fortunately was not stationary when overtaken. As the same express overran these signals again two months later, investigations into the condition of the equipment and allegations made concerning the working of the power operated distant signal had to be unusually exhaustive. There were track magnets at the distant signals but this engine was not equipped to work with them. The criticisms directed by some drivers against the inner distant, since removed, recalls the Queens Road accident of February 3, 1921, on the L.S.W.R., where a driver in foggy weather read a similarly worked signal as the outer distant

of the next signalbox, after which such working was abolished there and on the L.B.S.C.R., where a few examples existed. Later on, with changing conditions, this use of a distant type arm gained favour again.

Emergency Detonators

EMERGENCY detonators were exploded by the overrunning train but were not heard by enginemen or guard, and Colonel Wilson and his colleague, Brigadier C. A. Langley, travelling on an engine under practically similar conditions, did not find the warning particularly noticeable. Experiments showed there was a chance with the existing placer machines of the second detonator being sent off the rail by the explosion of the first, and it is recommended to look into the question of the spacing between the holders with a view to preventing such an occurrence. The explosive charge used in these placers also is less than that provided for detonators laid by hand, for some reason not clear to Colonel Wilson, who considers that this also calls for consideration. A completely unexpected audible warning should, if anything, sound more loudly than one which, as in the case of fog, enginemen might be expected to be prepared to hear, unless there is some really serious reason against it. Colonel Wilson feels that the risk to anyone chancing to be near at the moment ought not to weigh too much in trying to make these rarely needed warnings as arrestive as possible.

Route Setting at St. Pancras

ELECTRO-PNEUMATIC point operation combined with route setting and continuous track circuiting and colour-light signalling was brought into service at St. Pancras terminus, London Midland Region, last Sunday. This completed part of a scheme to improve the working on the old Midland Railway main line for some distance northwards, which was described in our issue for August 10, 1956. The point mechanisms had been brought into use already and marked temporarily from the two old signalboxes. These contained originally over 200 levers interlocked on the old Midland "tumbler" system and a good deal of control between the boxes was required. The large set of inner home girder signals, with 42 arms, gave place many years ago to combined signals and route indicators. The new installation introduces an even greater simplification. The adoption of electro-pneumatic mechanisms, of a highly perfected form, is of particular interest.

Karl Golsdorf

RUNNING uphill between Bischofshofen and Stainach-Irdning on the Austrian Federal Railways behind a 2-6-2 steam locomotive, one of the few two-cylinder compounds left in Europe today, one cannot refrain from reflecting on the designer, Karl Golsdorf, though that celebrated locomotive engineer has been dead for 40 years. Compound propulsion was his forte: two-cylinder for his earlier express and later small engines, and four-cylinder for the high-power types of this century. It culminated in the 2-6-4 express engines at one time dubbed as of "Adriatic" wheel formation and the single 2-12-0 engine built for the Arlberg line in pre-electrification days. This last unit long preceded the other European locomotives with six coupled axles. Golsdorf, as the 30 years of his chieftainship passed by, was faced more and more with the problem of providing high sustained output on axleloads never exceeding 18 tons and often limited to considerably less. Compounding, along with big boilers and fireboxes and, for the time, high steam pressures were his principal means to this end; but sometimes there was then comparatively little weight left for frame structures. Golsdorf enhanced the reputation of Austrian locomotive engineering established in the early days by such Englishmen as Haswell, Hall, and, later, Hardy; and the spirit and skill he infused and the training he gave led a dozen years after his death to the classic Austrian 2-8-4 design of Emmerich Karner and Alexander Lehner.

Future Developments in British Transport

NOT enough attention to the railway facilities has been paid by the planners of new towns or expansions of existing ones. In general, the mere existence of a railway line on or near a site seems to have been taken as sufficient indication that the railway will be able to comply with all the passenger and freight demands that the new community will make on it. Some pertinent remarks on the services that railways provide and on the form that facilities are likely to take in the future were made recently by Mr. A. J. White, Assistant General Manager of the Eastern Region of British Railways. He was addressing the Town & Country Summer School at Oxford.

One of his more controversial statements is that concerning passenger facilities in country towns. Of all the efforts being made to deal with population overspill problems, Mr. White maintains, transport undertakings must welcome with the greatest enthusiasm the expansion of country towns. Such places, he adds, usually have public transport facilities which can handle additional business without large capital improvements and the towns themselves are mostly on railways which are not used to capacity. That may be true of a good many places in Britain—at present.

Many, however, are situated on branch lines on which the train service has already been much reduced. The selection for expansion of such towns would necessitate improvements to the passenger services, which might not secure enough additional revenue to justify the cost. This would be the case where, for various reasons, including remoteness of the railway stations from town centres, the inhabitants had already ceased to use, or even think of, the railway. It is unlikely that the newcomers would be any more inclined to do so, unless the facilities provided were very attractive indeed—and costly. There are, on the other hand, many country towns, in the Eastern Region, for instance, well placed in relation to betterment of passenger services; and that Region has led the way in providing fast diesel trains. Mr. White states the case for closing branches and stations in certain circumstances, but adds that the process is slowing down. That may be so at the moment, but urgent need for economies may accelerate it before long.

Few will disagree with his forecast of quicker and more frequent diesel and electric services on British Railways. His reminder of the successful results achieved by the Netherlands Railways in improving passenger services is timely. The Dutch were able to seize the opportunity to effect their changes in good time; much that remains to be done in Britain will be too late if it is not done quickly, before the users of road transport forget, or close their eyes to, the benefits of the new services. Nevertheless the patronage of new facilities such as the "car/sleeper" trains shows that traffic can be regained by good service combined with judicious publicity. The explanation of the suburban passenger problem is lucid. Most of the facts and arguments are familiar to students of these matters, and they could not fail to convince many of Mr. White's audience.

Equally enlightening are his remarks on freight and on the railway transport problem in general. Here also he gives an able résumé of the present situation, with indications of future developments such as the increased use of containers and operation of fast power-braked trains. One can only wish that his prophecy will come true. This is that road contractors, although they doubtless will continue to carry much bulk traffic across country wherever road movement is cheap and convenient, "will otherwise tend to use the railways for their longer-distance trunk hauls, saving time and money in the process." But even when a good railway freight service is provided, it is hard to make potential users understand its benefits. These, however, are only a few points in a remarkably complete and clear exposition of the facts combined with an imaginative but sober forecast of developments.

Rail-End Hardening in New Zealand

AT the British Commonwealth Welding Conference, held recently in London and Saltburn-by-Sea, some details were given by Mr. G. K. Colligan, Welding Engineer with New Zealand Industrial Gases Limited, of the work that has been done on the hardening of rail-ends in New Zealand. The track conditions in that country are severe, as f.b. rails varying in weight from 70 to 91 lb. per yd. are run over by locomotives of up to the "K" 4-8-4 type, weighing with tenders 135 tons, at speeds up to 50-55 m.p.h. on the flatter sections of the 3-ft. 6-in. gauge tracks; there are also heavy gradients through the mountains, up to 1 in 50 on the principal main lines, and much curvature.

The rails are received in lengths of 30 to 42 ft., according to weight, and are laid with joints opposite one another and not staggered. Relaying in main lines is done with 91 lb. rail which has been flash-butt welded into standard 210-ft. lengths, and it is chiefly on this welded rail that the end-hardening now is being carried out. The composition of the rails is to the B.S.S. 1936 specification for flat-bottom rail, with 0·50-0·60 per cent carbon and a maximum of 0·05 phosphorus in the basic open-hearth process, 0·45-0·55 per cent and 0·06 per cent maximum respectively in the acid open-hearth process, and 0·40-0·50 per cent and 0·06 per cent maximum in the Bessemer acid process. In all three processes manganese is between the limits of 0·90 and 1·20 per cent, and silicon between 0·10 and 0·30 per cent, and sulphur must not exceed 0·06 per cent.

The aim in flame-hardening the rail ends is not so much to attain a certain hardness figure, but rather to obtain a certain percentage increase in hardness above that of the original rail. It is regarded as more advantageous to produce a reasonably substantial increase in rails of relatively low initial hardness, say 250 Brinell, than to add considerably to the hardness of a rail whose initial hardness is high, as in the latter case the hardened ends will be of a hardness considerably greater than that of the general body of the rail. The tendency then will be for stresses in excess of the fatigue limit to be set up in a zone about $\frac{1}{8}$ in. below the running surface of the rail, and for the upper layer to shell off.

In New Zealand the hardening extends from $1\frac{1}{2}$ to 2 in. from the rail-ends, and to a depth of from $\frac{3}{16}$ in. to $\frac{1}{4}$ in.; the aim is to produce an increase of about 100 in the Brinell hardness readings on the running surface, and to ensure a uniform transition from the hardened to the unhardened structure, both along the length of the rail and down into the head. An increase of 50 in the Brinell reading may be expected as a result of work-hardening, bringing the Brinell figure of the hardened zone up to 400 or so. The hardening is carried out equally over the full width of the rail-head.

As early as 1927 hardening of tram rails in situ was being carried out in New Zealand by the flame-hardening method with water quenching, and 10 years ago the first experiments along the same lines were begun by the railway administration. But in the latter case it was decided to abandon water-quenching in favour of self-quenching, i.e., the rapid lowering in the temperature of the heated rail-end by conduction to the body of the rail, as this obviates the risk of producing small areas of excessive hardness and makes for more even and consistent results. This method of hardening is now applied as standard practice at the welding depots to the ends of all 210-ft. rails after they have been assembled by welding, and hardening in situ of the ends of rails already laid is now to be begun. The specified requirements are a Brinell hardness of 350 to 400 for from $1\frac{1}{4}$ in. to 2 in. back from the rail-end, with the first $\frac{1}{8}$ in. back at a lower hardness of 280 to 300, in order to prevent breaking away under traffic of the square corner adjacent to the joint.

The equipment used comprises a bank of manifolded cylinders, not less than six each of oxygen and acetylene, provided with heavy duty regulators and hoses; a valve-block, complete with stand, which incorporates quick-acting and flame-adjustment valves and a metering gauge, the last-named to ensure a consistent heat value for each operation; a flame-hardening head and mixing unit, mounted on a jig, which positions it accurately on the rail-head; and a flame-plate or baffle. Fabricated from mild steel plate the baffle, a close fit to the rail-head, has been one of the secrets of success in the hardening process.

The design of the flame hardening head is of great importance. There are 52 jets, in a patterned formation extending over the width of the rail-head, and varying in diameter, according to their position, from No. 70 to No. 55 drill gauge; the difference in the quenching effect on the centre and the outside of the rail-head, and the slight convexity of the rail-head, thus are allowed for. The distance of the flame head from the surface of the rail is maintained exactly at $\frac{9}{16}$ in., and is frequently checked while hardening is in process.

A large volume of heat is applied in the very short space of 10 sec., which is the time spent on the actual hardening operation, and this involves a consumption of 700 cu. ft. per hr. each of oxygen and acetylene by the unit. Quick-acting clamps and screws ensure correct alignment and height with each positioning of the head on a rail, and the only measurement left to the judgment of the operator by eye is the $\frac{1}{8}$ in. by which the head is set back from the rail-end, in order, as previously mentioned, slightly to reduce the hardening effect at the extreme end of the rail.

One operator and one helper make up each hardening gang, under the supervision of an inspector or foreman, and it is found that a two-day course of instruction is normally sufficient to give the operator a complete grasp of the working of the equipment and a reasonable working knowledge of the requirements of the process. A very satisfactory uniformity of treatment has now been attained, and experience with end-hardened rails which have been in service in heavily-trafficked routes over the last four years shows that the rate of end wear of the unhardened rails which preceded them was $3\frac{1}{2}$ times as rapid.

While end-hardening of rails has not been attempted in sub-zero temperatures in New Zealand, experiments carried out in hardening at temperatures ranging from 32° to 90° Fahr. have shown practically no variation in result. The first work-hardening in situ has been carried out, and has shown the oxy-acetylene flame of high power can be controlled in field conditions to give as precise and consistent results as can be obtained from mechanically or electrically controlled machines on the production line.

Economic Role of Indian Railways

INDIA, more than almost any other country, is dependant on rail transport for its economic development. Its road transport is almost entirely local and provincially controlled, and inland-water and coastwise shipping are underdeveloped. Moreover, detailed statistics for a long period are available in India only for rail transport. These facts explain the emphasis on railway development in a recent article entitled "Transportation as a Condition for Future Development," contributed to the *Zeitschrift für die Gesamte Staatswissenschaft* by Mr. L. A. Natesan, Economic Adviser to the Indian Railway Board.

Pre-railway lack of industrial development in India is explained by these facts. Apart from the Grand Trunk Road constructed from Calcutta to Delhi about the middle of last century, there were no metalled roads outside urban areas. Country transport was limited to pack animals and rough bullock carts, which could ply on rough paths and tracks and could not be used at all during the four monsoon months of the year. The cost of salt doubled every 100 miles it was carried and the limitations on the carriage of such commodities as coal during the pre-railway period are obvious. Grain accumulated where grown and famines elsewhere were comparatively frequent because it could not be carried. Imports and exports were also drastically curtailed by lack of land transport.

Before discussing the impact of railways on the economy of the country, Mr. Natesan outlines the railway development itself, and its dependence on foreign capital. He condemns the policy of company operation under

guaranteed interest as causing heavy annual losses tc the State. However, railway route-mileage increased from 20 in 1853 to over 40,000 before partition in 1947. By 1880 the cost of carrying a ton of merchandise by rail was only one-quarter that by cart, and the lower freight rates were already stimulating economic activity and encouraging the establishment of new industries near railways, notably cotton milling. These tendencies have increased steadily since then, and the value of railways to mitigate the famine menace has been proved all over India; they have also ensured reasonable economic existence for the villager.

Foreign trade has also benefited from railway expansion. Between 1880 and 1890, for instance, route-mileage increased by over 80 per cent, the number of passengers carried rose by nearly 140 per cent, the tonnage carried by 116 per cent, the value of imports by some 60 per cent and that of exports by over 50 per cent in the space of this single decade. Mileage expansion has not been so rapid since 1900, but by 1954 the net-ton miles per annum per route-mile had increased 3½ times, and during approximately the same period coal produced in India increased by over 5 times, oil seeds by 3¼ times and woven goods by 8¼ times.

During the first two five-year-plan periods industrial development has been increasing and is expected to increase more rapidly than ever, and though railway mileage cannot expand proportionately, great efforts are being made to re-equip Indian Railways and increase their carrying capacity in every way. This is particularly so to meet the new heavy industries being established. That there is still wide scope for Indian railway development, is shown by a table in Mr. Natesan's article, from which the three most closely-comparable items are quoted below:—

Country	Route-miles per 1,000 square miles	Route-miles per 100,000 population	Passenger-miles per capita	Ton-miles per capita
India ..	27	9	103	72
Canada ..	12	272	181	3,722
South Africa	28	105	—	1,158

In fact, in the matter of ton-miles per capita, which provides an index of general economic activity of the country, the Indian figure is only one-quarter that of the next lowest country of the seven quoted in Mr. Natesan's list, and less than one-fiftieth of Canada's figure. In road mileage and shipping tonnage also, India is even more severely handicapped.

Wheel and Rail Lubrication

REMARKABLE increases in life of rails and wheel flanges through lubrication, in one case of rail life on the Italian State Railways, for example, by as much as 700 per cent, are quoted by Dr. Fritz Birmann, of the German Federal Railway, in his paper "Lubrication of Rails and Wheels," presented to the Conference on Lubrication and Wear held in London on October 1 to 3, as reported in last week's issue. He maintains also that only 15 to 30 per cent of locomotive stock need be equipped with automatic lubricating installations. The requirements of a lubricating system to reduce wear of rails and tyres, he states, are that the lubricant must be prevented from spreading to the running surface of the rail, thereby reducing traction; that the efficiency of the system must not be spoilt by dust, dirt or weather influences; that the lubricating devices and spray nozzles must be profile free on the rail and vehicle; and that lubrication must not start too late on the curve, so that it is preferable, where possible, to lubricate tyres before entering the curve. As to this last point, there appear at present to be technical obstacles to tyre lubrication before entering the curve with equipment mounted on the locomotive

Methods of rail lubrication are sub-divided by Dr. Birmann into four groups: by hand, or by means of hand tools; by self-propelled vehicles; by stationary installations on the line; and from the locomotive. Two methods of tyre lubrication, by hand and by automatic devices on the locomotive, are also discussed. Hand lubrication of rails, he points out, generally employed on curves with small radii or as a supplement when automatic lubricating devices are insufficient. The use of the self-propelled lubricating car on lines that have many curves is also mentioned, but because of the disadvantage of the need to operate the cars several times a day, depending on traffic density, they have not been generally popular.

Rail lubrication stationary installations, which are operated either by the bending of the rails under the weight of the vehicle or through a piston being pressed down by the tyre of the wheel, are to be found in varied types. In all these lubricating systems an extremely small quantity of grease or oil is, each time, automatically applied to the flank of the rail, being picked up from there by the tyre and spread further. Examples of this type include the P. & M., Hurcol, and the De Limon systems; the last is now being tested on the German Federal Railway. Dr. Birmann states that the amount of grease consumed by this installation is only about 0·1 g. per axle, or 50 kg. per annum with average traffic.

On the question of lubrication of the rail from the locomotive, Dr. Birmann mentions, among others, the Lubrovia rail lubricator of the French National Railways; this in its latest design makes use of a mechanical or electrical cam control operated by the change in orientation of the bogie frame or drawbar with reference to the main frame of the locomotive. Oil is sprayed on the rail flank by compressed air, or in one special design, by steam.

On methods of flange lubrication by hand, he comments that, although used successfully by the Swiss Federal Railways on electric locomotives on the St. Gotthard line, it can be employed only with great care and with other railways has proved less effective. One of the automatic flange lubricating devices on locomotives, he describes, is the De Limon flange lubricator, which uses grease as the lubricant; this because of its intrinsic viscosity clings fast to the flange and to the flank of the rail and does not spread on to running faces. The installation, which consists of a grease pump with compressed air distributor and a spraying nozzle in front of each of the leading flanges of the locomotive, is operated automatically after every 150 to 200 m. of running, independently of curves or speed. On the basis of the experience of the German Federal Railways, only one in three of the steam and electric locomotives and railcars are at present fitted with flange lubricators.

Dr. Birmann then discusses the requirements which oils and greases must fulfil to be suitable for rail lubrication. In the case of oil, the lubricating conditions must be assessed carefully, both at relatively high temperatures when tyres run hot because of braking and low temperatures when there is frost, and the oil must have the properties of clinging strongly, even to a wet rail, and of not emulsifying with water. Grease, to be suitable, must have a consistency which hardly varies over a wide range of temperature, must be insoluble in water, must be able to be delivered and to lubricate between +60° and −30°C., and must have a soft, short fibre and be easily atomisable.

Besides the increase in the life of rails mentioned above, he also refers to other economies. These include one S.N.C.F. servicing workshop where the annual cost of re-turning wheels had been some £1,000: with lubrication, an estimated yearly saving of £400 was obtained, even after allowing £450 for 10 per cent depreciation, for servicing, and for oil consumption. Other examples given by the author suggest that reduction of rail and flange wear in the order of one-half to one-third by efficient lubrication systems can be expected. There does not seem to be any reason to suppose that the full application of a lubricating system, in this country, particularly of a type of locomotive-carried flange lubricator, should not lead to similar economies.

Critical Year for U.S.A. Railways

(By a correspondent)

AT one time the view of the current wave of inflation generally taken by the people of the U.S.A. was that their country, with its great resources, would still go ahead and prosper. It is now obvious that inflation has prevented trade and industry from expanding in some directions. U.S.A. consumption of coal to July 1 declined by 17,807,000 tons, or 7·7 per cent. Over 32 weeks coal output was 140,000 tons under last year, although overseas coal shipments were running at 36 per cent above 1956 and 120 per cent above 1955. Stocks of coal rose by 2 million tons in June to 78 million tons, or 76 days' supply. On July 1 ore stocks were 1,500,000 tons greater than last year, and consumption for the first six months was about 750,000 tons above 1956. In some recent weeks steel output represented only between 80 and 90 per cent of the capacity of the plants. Apart from coal and coke, the quantity of export and coastal freight, handled through all ports in July, was 3 per cent less than a year ago.

The railways felt the brunt of these partial recessions in productivity. In 32 weeks to August 10 wagon loadings were 671,240 fewer than last year, a decrease of 3 per cent. Grain, coke, and ore were the only commodities to load more freely. Miscellaneous and manufactured goods filled 572,100 fewer wagons than in 1956, a drop of 5 per cent. On an average each of the lost wagons would have earned a gross freight revenue of $350. Less-than-wagon-load traffic threatens to disappear entirely before long; it occupied 163,805 fewer wagons, a decline of 8·7 per cent. In July the railways had an average daily surplus of over 18,000 wagons.

Total railway operating revenues in the first six months of 1957 were $5,234 million, $2·5 million less than in 1956. Freight revenue increased by only $10 million, or 0·2 per cent, though certain charges were higher, while passenger, mail, express, and miscellaneous revenue were all down. On the other side of the account, operating expenses of $4,110 million were $79 million, or 1·8 per cent, up, and the operating ratio rose from 77 to 78·5 per cent. This confirms the established principle that, as traffic and revenues decline, operating expenses and other costs cannot be reduced at a proportionate rate.

On September 27 *The Railway Gazette* reported that the Interstate Commerce Commission had authorised higher freight rates to meet increased costs of $627 million a year since the last general freight rise in March, 1956. The Commission estimated that the increased charges would yield $897·8 million in additional revenue each year, but that calculation was based on 1956 traffic and will not be reached in practice. On November 1, 1957, the railways will have to meet a further advance of $176 million in wages and will be forced to press for an extended authority to raise charges once more. In the meantime, coal roads like the Chesapeake & Ohio, Norfolk & Western, and Virginian have low operating ratios and are prospering, while the Pennsylvania and New York Central, with ratios of 84 or 83 per cent, are suffering heavy losses in net railway operating income, on earnings before charges. Since August, 1956, the average price of representative railway stocks has fallen by 13 per cent and the railways cannot raise fresh capital for new works in the open market in present conditions.

LETTERS TO THE EDITOR

(The Editor is not responsible for opinions of correspondents)

Railway Operating Statistics

September 25

SIR,—The analysis of British Railways Operating Statistics contributed by a correspondent in your issue of August 16 affords another opportunity of illustrating the extent to which these figures mislead.

Your correspondent remarks that it is odd more steam miles were operated to move a diminished volume of traffic, but this phenomenon can easily be understood when it is recalled that freight flows in two directions. The balance each way is never stable but always fluctuating. If traffic increases in the direction in which it already predominates, more train miles will be required even though traffic the other way declines with a net decrease in total volume.

The variation in the balance of traffic movement each way is one of the major fortuitous causes of fluctuations in many freight operating statistics. It affects the gross and net tons per train mile and per train engine hour and the wagon turnround. It affects each figure differently but the effect is greater than could be caused by the most extravagant variations in operating efficiency.

As I pointed out in a series of articles in *The Railway Gazette* in August and September, 1954, the effect of a heavy seasonal one-way traffic is to cause an apparent decline in efficiency just at the time when all-out efforts are required and this decline is misinterpreted if the statistics are taken at their face value as they actually are. Thus the decline from 162 to 155 tons is not a decline in the average train load; it is most probably a reflection of a fluctuation in the balance of traffic. The recession from 233 to 229 in the wagon-miles per train mile is most probably due to the same cause; your correspondent refers to this statistic as a "measure of mobility"—presumably of the wagon—but of course it is not. The decline in the average wagon load to just over four tons is not due to "poor" loading. The figures of 9·32 and 9·56 m.p.h. are not the average speed of freight trains.

The text books on these statistics are wholly misleading; these figures do not, and in their present form cannot, reflect either economy of operation, or the efficient use of rolling stock and locomotives. An even greater mistake is to use them for the calculation of average costs as a basis for route fixing. It is not difficult to replace them by more useful and realistic statistics though an entirely different approach is required.

Yours faithfully,

A. R. G. SAUNDERS
Traffic Manager,
Sierra Leone Railway

Freetown, Sierra Leone

Steam Locomotive Sounds

October 7

SIR,—Your correspondent Henry Maxwell gave a graceful appreciation in your September 20 issue of the latest recording of locomotive noises. On the same day that I read his letter I received a letter from a friend in Qatar who has also several of these recordings. Apart from expressing his own nostalgia at being able to hear the noises of a Bulleid Pacific in the tropical areas of the Persian Gulf, he also mentions the interest of the Arabs in hearing such noises 500 miles away from railhead.

Now surely it only remains for some enterprising firm to arrange for us to have bottles of locomotive smells. Then in my dotage, and above the clanking rattle of Southern Region electric units, I should be able to be completely nostalgic, not only hearing the noises of the age of steam but smelling the distinctive odours of the cab of a "West Country," or the lovely aroma of hot oil from the steam chest of a Robinson "Director."

Yours faithfully,

P. RANSOME-WALLIS

The Corner House, Herne Bay, Kent

THE SCRAP HEAP

Last Furness Railway Locomotive

The sole survivor of the locomotive stock of the former Furness Railway has been withdrawn by the London Midland Region for breaking up. During its life the engine ran 633,948 miles, mostly on its home ground, hauling freight trains in the Westmorland and Cumberland districts. No. 52510 was a class "3," 0-6-0 freight tender locomotive built in 1920 by the North British Locomotive Co. Ltd. to the design of W. F. Pettigrew, Locomotive Carriage & Wagon Superintendent of the F.R. Originally it carried the Furness Railway number 33, and was finally renumbered 52510 in British Railways stock. In the form in which it went to Horwich Works for dismantling, it differed from its original design, having been fitted with a L.Y.R. "O" type Belpaire boiler.

The two cylinders were 18 in. dia., 26 in. stroke; coupled wheels 4 ft. 7½ in. dia.; tractive effort 23,222 lb. at 85 per cent boiler pressure; and total weight in working order 44 tons 17 cwt. (engine) and 37 tons 9 cwt. (tender).

The last surviving locomotive of the former Furness Railway, now withdrawn for breaking up

Truly Victorian

Those who look with some horror on the Charing Cross façade probably do not know that the building was celebrated in 1865 when it was completed. It was a venture of the South Eastern Railway and was one of the first London buildings to make extensive use of terra-cotta for ornaments as well as white brick and mouldings of cement—a truly Victorian conglomeration. Its roof also imitated that of the Louvre, which was considered of interest. Station, hotel, and the open space in front, which was designed for horse vehicles, occupied a space where the old Hungerford Market had been and some quaint old buildings. One of its amenities was a "rising room," which seems to have been an early passenger lift, for it was provided with comfortable seats for patrons who did not wish to ascend the grand staircase.—*From "The Manchester Guardian."*

East Coast Route Godfather

"The Fair Maid of Perth," third of the Waverley novels to provide a name for a London-Edinburgh express, started her career yesterday morning [September 16] from Kings Cross at 7.45. Her dutifulness was worthy of Sir Walter Scott's heroine.

She arrived in Edinburgh, according to the stop-watches of the experts, only 15 sec. late. En route she was never more than two or three minutes off schedule either way.

Like Catherine Glover, as Perth knew the "Fair Maid," she was the very soul of honour. Some might like her to be faster, but the locomotives that pull her—*Quicksilver, Merlin* and the rest—are over 20 years old.

Anyhow, the "Fair Maid" enables businessmen to get to Perth—if they ever go there for more than pleasure—early enough to transact affairs and return to London the same evening by sleeper.

Only one problem remains. Can Sir Walter be godfather to any more London-Edinburgh trains? — *"Peterborough" in "The Daily Telegraph."*

Argentine Railway Jubilee Medal

The locomotive "La Porteña" featured in the Argentine Railway jubilee medal struck on the occasion of the celebrations in 1907 (*see also our August* 30 *and September* 20 *issues*)

Diesel Dilemma

(*See our September* 20 *issue*)

Poor old A.B., still pipe-dreaming
Of the days that were of yore,
Lots of steam and coal-filled tenders;
Diesels really make him sore.

I went tracking down to Padstow
By "Atlantic Coast Express,"
Shared the joys of coal and water;
All my clothes were in a mess.

Corridors and coaches covered,
Faces black with grit and grime,
All included in the ticket—
Only extra was for wine.

Poor A.B., with all his worries,
Television, radio,
Electric light, refrigeration,
Even aeroplanes, I trow.

Let us don our woad and fur skins,
Sit around the fire of wood,
Dream into the future setting,
As all thoughtful cave-folk should.

There is hope, and he admits it;
There is learning he must do;
And perhaps when he has learned it,
Joy and pleasure may accrue.

Clanking diesels make their music;
Puffers make a different din.
But the noise the B.T.C. needs
Is of shekels rattling in.

A.C.P.

OVERSEAS RAILWAY AFFAIRS

(From our correspondents)

RHODESIA

New Passenger Timetable

An improved passenger service will be introduced on December 2. Features are the standardisation of arrival and departure times for the Salisbury-Bulawayo mail trains; and improved arrangements on the North line so that passengers will be able to spend a weekend, or as little as a day, at Victoria Falls. Better connections will be given with improvements in the transit times to Durban and the coast of Natal.

The overnight mails between Salisbury and Bulawayo in both directions will depart at 8.30 p.m., arriving at 7.30 a.m. next morning. Mail trains for Ndola will leave Bulawayo at 8.45 p.m. on Mondays, Thursdays, and Saturdays, 30 min. later than at present; they will arrive in Ndola half an hour earlier, at 6.30 a.m. Southbound trains will depart from Ndola 30 min. later, at 8.45 p.m., on Sundays, Wednesdays, and Fridays; they will arrive in Bulawayo 1¼ hr. earlier, at 7 a.m.

South African Railways has agreed that mail trains for Johannesburg should leave Bulawayo 3 hr. earlier, at 10.30 a.m. The present 4-hr. wait for a connection in Johannesburg will be reduced to 1¼ hr. in the case of two trains each week and 2½ hr. for the third train. Passengers from the Federation will arrive in Durban at 9 a.m. on Tuesdays and Thursdays and at 11.15 a.m. on Sundays. For passengers coming from the north and east of Bulawayo the time taken to reach Durban will be reduced by 9¼ hr.

New Railway Recreation Club

A new Recreation Club building has been opened at Gwelo by Lt.-Colonel H. B. Everard, General Manager of Rhodesia Railways. The clubhouse, shown in the accompanying illustration, includes a billiards room, bar, and changing rooms. Interior decoration is in a contrasting style, to give a colourful effect. The sports grounds on which the clubhouse stands are being extended and developed. The clubhouse was designed by the Rhodesia Railways Architect and constructed departmentally.

Bulawayo-Nkana-Kitwe Service

Through passenger coaches are now running between Bulawayo and Nkana-Kitwe in Northern Rhodesia. Between Ndola and Bulawayo the coaches form part of the north- and south-bound mail trains.

Coal Railings

Preliminary figures show that by moving 341,414 tons of coal and coke from Wankie Colliery during August, the railways have broken all previous records. Previously the best month was May, when the tonnage was 327,745.

During August 77,350 tons of coal was consigned to the Northern Rhodesia copper mines, which ended the month with about 233,000 tons of coal on their stockpiles. Advance figures show that 197,217 tons were consigned to places south of Wankie and a total of 144,197 tons to the north.

PAKISTAN

Civil Engineering Developments on N.W.R.

The North Western Railway now manufactures most of its permanent way fittings and cast-iron sleepers and is turning out from its own workshops about 15,000 concrete-block sleepers annually. A number of tamping machines, rail-loading devices and other mechanical equipment have been acquired lately and a rail-welding plant is at present on order or has been recently received.

An important programme of bridge-strengthening is in hand. As briefly described in our issue of September 13 last, the Ravi Bridge at Abdul Hakim has been regirdered, and the Sher Shah bridge over the River Chenab, consisting of 17 spans of 200 ft. has been strengthened at a cost of about £37,500. The cantilever Lansdowne Bridge over the Indus at Sukkur is to be replaced at an estimated cost of £750,000.

The whole of the main line and the more important branches are now equipped with train or traffic control, there being five main control and six sub-control offices. The provision of portable control telephones in passenger brakevans has been approved and a network of wireless telegraphy and telephony is being installed. Remote-control and power-signalling is to be introduced at Kotri and Samasata junctions.

Recreation Club building at Gwelo, Rhodesia Railways, showing verandah on to which the main hall opens

INDIA

Tourist Siding at Howrah

The present spur siding between the power cabin and the Buckland Bridge approach at the extreme end of Howrah Station is to be converted into a tourist siding, which will have a platform of its own with facilities for receiving one tourist train of nine bogies.

Access to West Coast Ports

Traffic demands on the port of Bombay, and the need for providing better rail facilities for Kandla (Kutch), which is served by a metre-gauge branch of the Western Railway, have led the National Harbour Board to recommend the desirability of constructing the Konkan railway southwards from Bombay, and a broad-gauge link from Kandla to Jhund.

With the building of the Konkan railway three berths used by ferry services in Bombay are expected to become available for deep-sea ships.

The port of Kandla increased railway capacity for dealing with the anticipated traffic and opening up the hinterland further. The need for building a broad-gauge line linking Kandla with Ahmedabad is considered essential.

UNITED STATES

Merging Chicago Terminals

For many years past the prospect has been envisaged of a single Union Terminal to accommodate all the railways entering Chicago on the south side, and investigations are now reaching a more definite stage. The present idea is to build a single station which will replace the existing Dearborn Street, La Salle Street, Grand Central, and Illinois Central 12th Street terminals, to accommodate the passenger traffic of 16 railways in all. An enquiry is now under way as to the best site for such a terminal and how the plan can be

financed; on this the city and the railways concerned are spending up to $250,000 in equal shares.

It is proposed that the costly work involved should be financed by a bond issue handled by the terminal authority, any deficiency being made good out of state or federal funds. The railways would pay terminal rentals based on the cost of operation in their present terminals, and it would be necessary to ensure that the cost of working the new station should not exceed the total operating costs of its four predecessors. It is also proposed that the new terminal should be tax-exempt, although such a provision would immediately raise the question of the taxation of the other railway terminals in the city. The biggest problem, however, is the choice of the best site, and a report on the survey for this is not expected before May, 1958.

FRANCE

Bridge Reconstruction at Bordeaux

The 560-ft. Guit road bridge, which crosses the railway tracks and goods yard about 100 yd. south of the passenger station at Bordeaux St. Jean, carries a considerable road traffic, as it connects the town of Bordeaux and the parcels station with important trunk roads. Owing to the deterioration of the bridge, built in 1861, it was decided to replace this bridge by one of modern design.

Because of the intense railway traffic into and out of Bordeaux St. Jean it was essential to plan the new structure to avoid undue interference with train working during construction; the bridge deck had to be of minimum thickness in order to give adequate clearance for electric catenaries.

The new bridge is in three sections. On the east side of the railway is a three-span approach section, approximately 134 ft. long, followed by the six-span main section of some 370 ft. over the running tracks and a two-span section of 56 ft. over the parcels station. For the first two sections, a deck of reinforced concrete is supported on six continuous steel girders encased in cement, but for the short-span section over the parcels yard the reinforced concrete deck rests direct on concrete supports.

WESTERN GERMANY

Telephone Communication with Trains

The Federal Railway has equipped six express train sets with public wireless telephone facilities on the ultra short wave system.

Calls from and to the trains in question are therefore only possible within the range of the local transmitting stations. Although the trains concerned run between Frankfort and Amsterdam (" Rhein-Main "), Stuttgart and Dortmund (" Schwabenpfeil "), and Munich (via Frankfort and Cologne) and Hamburg (" Gambrinus "), long-distance calls en route can only be made on certain portions of the route, namely Frankfort and Wesel (" Rhein-Main "), Maulbronn and Cologne (" Schwabenpfeil "), and Aschaffenburg and Hamm ("Gambrinus "). No telephone call from and to the " Gambrinus," for instance, is possible between Munich and Aschaffenburg on the southern portion of its route and between Hamm and Hamburg in Northern Germany.

Each train has an individual telephone number which can be reached from the Frankfort and Düsseldorf trunk exchanges. The set is installed in a soundproof call box. Communication is possible with any place within Europe. The exchange on the train is operated by the train typist-secretary who summons passengers for any incoming calls. Ultra short wave telephone calls are almost fully immune from interference. The system offers considerable advantages compared with the prewar experimental telephone service in certain trains between Berlin and Hamburg.

Extension of the present service to other trains depends on the completion of the wireless telephone network of the German Federal Postal administration. At present the latter prefers to install more local wireless telephone services for taxi proprietors, road hauliers, and so on.

DENMARK

More Nohab Diesel Locomotives

The first of a new series of 1,900-h.p. diesel-electric locomotives was delivered recently by Nydqvist & Holm (Nohab), Trollhättan, Sweden, to the State Railways. The order follows a previous delivery of 24 such locomotives.

Built by Nohab in collaboration with General Motors, the locomotives have a top speed of 83 m.p.h. and a maximum tractive effort of 18 tons. The weight in working order is 106 tons.

Publications Received

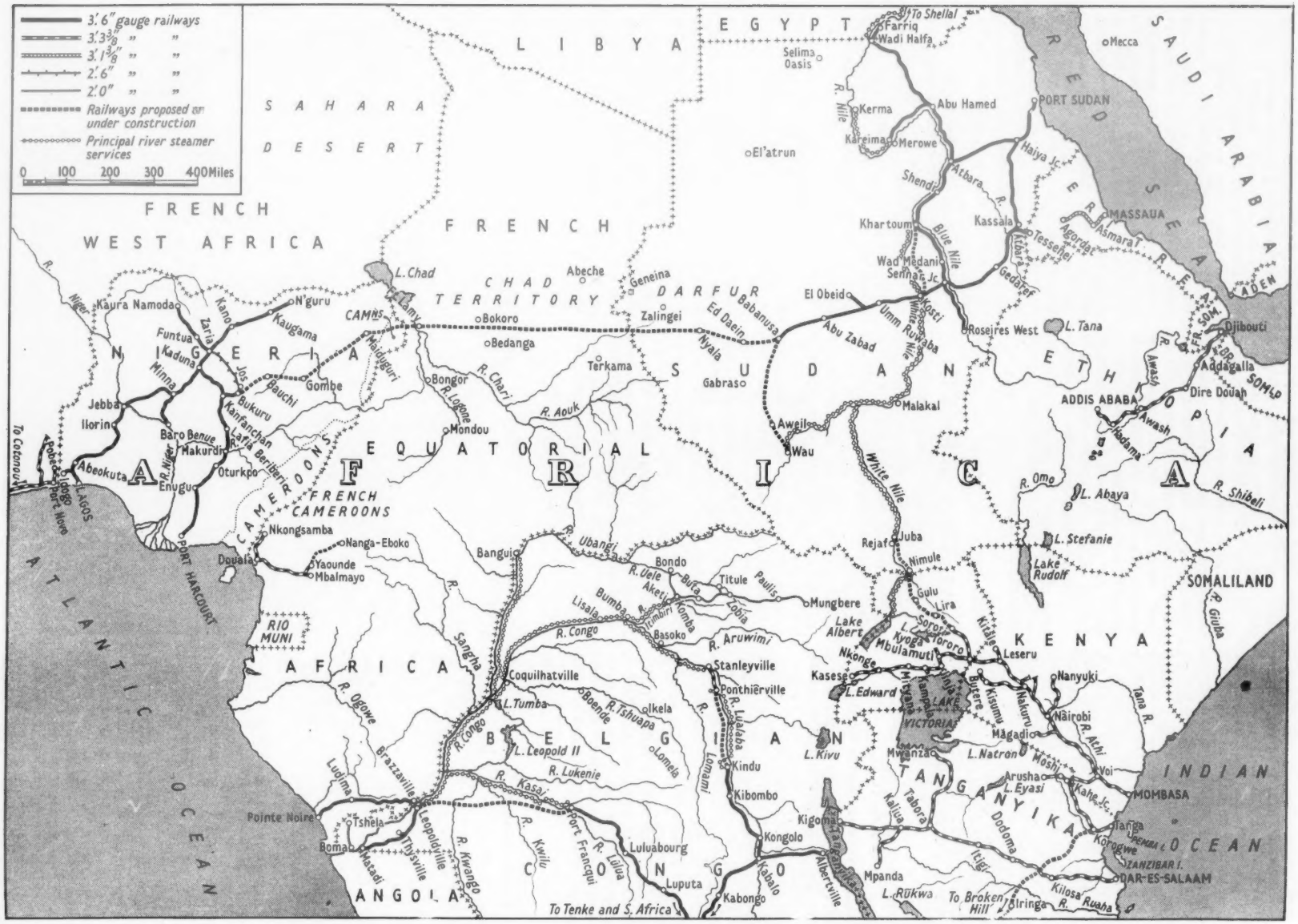
Famous Locomotives of the World.—By C. Hamilton Ellis. London: Fredk. Muller Limited, Ludgate House, 110, Fleet Street, E.C.4. 7½ in by 5 in. 143 pp. Illustrated. Price 9s. 6d.—In this latest addition to the " Globe " series, Mr. Ellis has produced a book suitable not only for the young people for whom the series is intended but for all who are interested in railways. He gives a condensed history of the steam locomotive, readable and often absorbing, but does not hesitate to turn aside to give more details of his favourite locomotives. Most of the book is concerned with steam, but there is one chapter on electric locomotives. An appendix deals succinctly with locomotive wheel arrangements. The book is illustrated with an attractive selection of photographs and a number of sketches by the author.

Trains Annual, 1958. Edited by G. Freeman Allen. Hampton Court, Surrey: Craven House. 9¼ in. × 7¼ in. 96 pp. Illustrated. Price 10s. 6d.—The 1958 edition of this annual lives up to the high standard set in previous years. As is perhaps to be expected, the main accent is on locomotives and locomotive working, with an article by O. S. Nock on postwar locomotive development at Swindon, a contribution by Dr. Tuplin on compound locomotives, and a description of footplate work in Austria by P. Ransome-Wallis, besides other articles giving prominence to locomotives. Marshalling yards are represented by a description of Whitemoor by B. Perren, and signalling by a review of automatic train control by T. S. Lascelles. These, with other articles, and a fine collection of photographs, make up a very good issue.

Metals in World Transport.—This 40-page publication has been prepared by the Tube Investments group of companies, Broadwell Works, Oldbury, nr. Birmingham, to illustrate some of the many applications of its products in the field of road and rail transport vehicle engineering. The group produces a variety of semi-finished raw material including steel tubes in differing qualities and cross-sectional shapes, aluminium alloys in various forms, and cold rolled and pressed sections of several kinds of metals. The booklet also discusses, with the aid of photographs and diagrams, the construction of light-weight steel and light alloy rolling stock and commercial road vehicles, as well as seating for railway coaches, railcars, and passenger service vehicles.

Winter Sports.—The 1957-58 winter sports programme of Thos. Cook & Son Ltd. and Dean & Dawson Limited lists the customary variety of holidays in various European countries. It includes—besides Switzerland, Austria, France, Norway, Sweden, and Germany—Italy (Alpine and Dolomite resorts), Spain (the Pyrenees), Jugoslavia (the Julian Alps, in Slovenia)—and Scotland (the Cairngorms).

A.B.C. Coach and Bus Guide: Winter Services 1957-58.—This now-familiar guide contains details of fewer new developments than usual, mostly as a result of the fuel difficulties early in the year. Information is incorporated on Continental services and coach/air services, including connecting train services in some cases. Long-distance coach services, such as London-Calcutta and London-Johannesburg, are forecast. The guide is published by Index Publishers Limited, 69 Victoria Street, London, S.W.1, price 5s.



Railways in North Central Africa, showing route of the proposed trans-Africa link through Chad Territory

Railways in North Central Africa

Need for a trans-Africa link through Chad Territory: growing traffic potential of interior

AMONG the populated regions of the world still unserved by rail is a substantial area in North Central Africa lying in Nigeria, French Equatorial Africa and the Sudan. Few railway developments have taken place in this region for 40 years, but schemes are now being planned and executed which, apart from assisting in the progress of the region, will make further development possible.

In the west the survey for an extension of the Nigerian 3-ft. 6-in. gauge system by about 400 miles of line from Bukuru through Bauchi and Gombe to Maiduguri has made good progress and it is confidently expected that the necessary capital can be obtained and the line completed in from six to eight years. This extension will largely meet the internal needs of the Federation and will enable the agricultural potential of Bornu province to be fully developed.

In the east, El Obeid has served as the western terminal of the Sudan 3-ft. 6-in. gauge system since 1912, but in the last three years good progress has been made with an extension which has now reached Babanusa. This has already involved the construction of 240 miles of new line. The Sudan Railways hope by 1959 to reach Nyala, the principal centre in south Darfur; this work involves a further 200 miles of new line. These extensions, totalling 440 miles, will bring the province of Darfur effectively within the Sudan exchange economy for the first time. It is of interest to note that the Port Sudan to Nyala line will penetrate much further into the Continent than any other railway in Africa. The Sudan authorities are also planning a southwards extension of about 300 miles from Babanusa to Wau to replace the unsatisfactory seasonal river service and to speed up the development of the Bahr El Ghazal Province.

Chad Territory

In the French-administered territories consideration is being given currently to the best means of serving the remote Chad Territory (the northern part of French Equatorial Africa). The metre-gauge Cameroons system, based on Douala serves only a limited area. The principal route on French territory is over the 3-ft. 6-in. railway from Pointe Noire to Brazzaville and then by river service to Bangui. From Bangui to Fort Lamy (capital of Chad Territory) a service is provided partly by road and partly by craft on the Chari river. As this route is long, costly and slow a high proportion of goods to and from Fort Lamy travel via Nigeria, about 700 miles by railway and 600 miles by road. The French authorities are understood to be favouring the construction of a light narrow-gauge railway from Bangui to Mondou or Bongor.

It may be noted that further south, in the Belgian Congo, the most northerly railway is the Vicicongo 2-ft. gauge line from Aketi (on the navigable system of the Congo) to Bondo and Mungbere. Still further south recent work has brought the southern Africa 3-ft. 6-in. gauge system as far north as Kindu.

The railways being constructed and planned in the Sudan and Nigeria are all within the savannah belt which lies south of the Sahara and stretches from Senegal to the Nile. This has become a growing groundnut exporting area with Nigeria and French West Africa as the leading exporters. In the Sudan groundnut exports from the area west of the Nile are increasing rapidly. Sesame, another important oilseed, is grown in the same region, which also produces most of the world's gum. The extensions planned in both countries will enable new areas to be brought into production, but their impact on Chad Territory will be relatively small. The main oilseed producing part of the savannah belt lies roughly between 10° and 15° N., and there is no reason to believe that substantial production could not be obtained from Chad Territory if the produce could be taken to the seaboard quickly and cheaply. Additionally, the area, which already has substantial numbers, is well suited to the rearing of cattle and sheep for which there is a growing market in the wealthy oil-producing countries of the Middle East.

The factors point to the need for a continuous railway through the middle of the productive belt. When the projects now planned are completed the gap will have been reduced by 840 miles and the terminals of Maiduguri and Nyala will lie less than 800 miles apart on the 12° N. parallel and with no great physical obstacles between them. A 3-ft. 6-in. link through Chad Territory appears to be indicated. In this way the only trans-African rail route north of Lobito Bay-Beira would be provided.

Apart from giving Chad Territory two direct rail routes to the sea, the line would bring other advantages to the countries concerned. First, there is a large annual movement (of the order of 20,000) of West African Moslem pilgrims to and from Mecca. The numbers are tending to rise with improved economic conditions. East of El Obeid the pilgrims move directly and quickly by rail but between El Obeid and the public transport services of West Africa, they undergo great hardship and suffer delays. The movement would be greatly speeded up and much human suffering avoided if a direct rail service was available across Africa.

Secondly, the link is likely to result in a gradually increasing exchange of traffic between the countries connected by the direct line. Africa has tended to develop fairly well defined traffic areas based on ocean ports around the coast. As the simple export/import economies are diversified there are opportunities for trade. Experience shows that when reliable direct links are provided the exchange of goods increases.

North-South Link

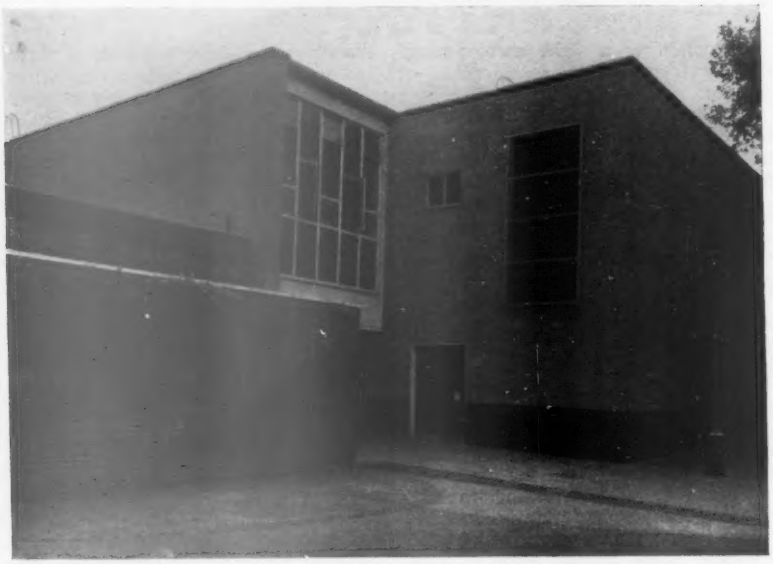
Looking further ahead it seems possible that when a direct east-west link has been completed, the time may be opportune to consider a north-south link with the 3-ft. 6-in. systems of southern Africa. Such a link would join into a single 3-ft. 6-in. system all the principal countries south of the Sahara, with the exception of the British East African territories, Ethiopia, and French West African territories. Such a connection would greatly help the movement of passengers and the exchange of goods throughout Africa. It is to be hoped that the existing metre-gauge lines can be converted to 3-ft. 6-in. gauge when it becomes possible for them to join the main 3-ft. 6-in. system.

Should there ever be a spectacular economic advance in North Central Africa, such as might follow from a major mineral occurrence, it might even be possible to consider the building of a direct line through Libya to the Mediterranean. This would provide a direct route between tropical Africa and Europe. The distance from a point on the suggested east-west link near the Chad-Sudan border to the Mediterranean is not significantly greater than the distance to the Red Sea or the Atlantic, and shipping distances and costs would be reduced. There is, of course, no need to consider such a link at the present time.

The immediate issue is to decide what should be done to provide the minimum transport services necessary for the development of the resources of the region. Experience elsewhere has indicated that it is unwise to plan major transport facilities and to deal with rating problems on a narrow national basis. The aim should be to provide the transport routes which best serve the area as a whole and then evolve methods of finance and charging which are fair to the various parties. The time seems ripe for the three countries principally concerned with the immediate issues, namely Nigeria, French Equatorial Africa and the Sudan, to consider jointly the needs of the area and how they can best be met.

New Substation at Charing Cross, London Transport

Rotary converters replaced by mercury vapour rectifiers



Substation building constructed on new girders over the District Line station

CHARING CROSS substation, which serves sections of the District, Northern, and Bakerloo lines of London Transport, has been entirely re-built and re-equipped with modern plant. It is at present operating up to about two-thirds of its capacity and the changeover from the old plant is being carried out in stages to avoid any interruption to passenger service.

The new substation, which is wholly above ground, is fed from Greenwich Power House at 50 cycles, via Aldgate Switch House, and is being equipped with rectifying units totalling 9,000 kW. Space is available for a further two 1,500 kW. units to meet possible future requirements. Ignoring the provisions for future expansion, this means that 9,000 kW. of modern equipment will be doing the work previously done by 10,000 kW.

The site chosen for the new substation was formerly a poster bill store, which straddled the District Line station. In addition to the new electrical plant, the new building incorporates facilities for improved ventilation of the tube tunnels in the area, at a later date.

The District Line platforms and old substation, over which the new building has been erected, were not designed to take any substantial additional loads and their strengthening and adaptation posed several problems to London Transport engineers directed by Mr. C. E. Dunton, Chief Civil Engineer. The railway retaining walls, built in 1869, and part of the roof steelwork of the original substation had to be strengthened; a new girder, 65 ft. long, spanning the platforms and tracks had to be placed, as the existing steel was inadequate; and additional underpinning steel was required beneath the stanchions carrying one of the girders of the exit footbridge.

As the plant with which the new substation is equipped is practically free from vibration and does not need heavy foundations, it has been possible to install the new equipment on suspended floors.

In the new building itself, the design of which was prepared by Mr. T. Bilbow, Architect to London Transport, the load carrying has been accomplished by placing new girders above the level of the footbridge walls, so that no loading of the new walls or roof is transmitted to the existing girders, and by using lightweight construction wherever possible.

Over the rectifier room, where the heaviest machinery is located, a clear roof span is essential and a lightweight roof has therefore been used, consisting of light steel lattice beams carrying four aluminium monitor ventilators. The intermediate panels of the semi-flat roof are of aluminium decking, finished with lightweight waterproofing material and a fireproof topping.

Layout

The ground floor of the new building houses the rectifiers and transformers, together with the high voltage a.c. and the d.c. switchgear, while the rectifier relay panels, lighting and signal switchgear, batteries, battery distribution switchboards, and battery charging units have been installed on the upper floor. The control room, from which the power and signalling supplies for a large area will eventually be supervised, is also located on the upper floor. It will, however, not be equipped for some time. Control of the new substation will be carried out from new temporary panels situated in an adjacent room.

In general, the new equipment is similar to that installed at Bond Street in 1954 and described in our issue of May 7, 1954. As at Bond Street, its manufacture and installation has been

Rectifier room showing (left) Nos. 4 and 6 rectifier sets; (right) Nos. 5 and 7

carried out by the Hackbridge & Hewittic Electric Co. Ltd., to the requirements of Mr. T. S. Pick, Chief Electrical Engineer of London Transport.

Rectifiers

The substation is designed for an ultimate capacity of 12,000 kW., comprising eight rectifier sets each of 1,500 kW. rating. Six sets are being installed in the first instance, a nominal 9,000 kW. being considered adequate for the prevailing needs. These are capable of sustaining the short, heavy overloads normally called for with suburban railway equipments; they comply with class III rating of BSS. 1698:1950.

A 1,500 kW. set comprises a pair of 750 kW. half-units, each with its own transformer and each employing six-phase rectification. It is arranged, however, for the combined set to operate 12-phase; this being achieved by winding one transformer with a star primary, the other being connected in delta, so that the secondary phases of one are 30 deg. out of phase with those of the other.

As at Bond Street, the transformers are closed-circuit air-blast cooled, thus eliminating the risk of fire. Each one is housed in a sheet steel enclosure, air being continuously circulated through a heat exchanger which constitutes a form of tubular radiator with an external cooling fan. By this means the heat developed in the transformer is dissipated indirectly and no dust or dirt its drawn into its windings.

The rectifier bulbs are mounted above the transformer housings. The inter-phase transformers, fan control reactors, and auxiliary transformers are located between the pair of main transformers forming a 12-phase set. It would have been impossible to get the required capacity of converting plant into the space available, without using this type of construction; a 1,500 kW. set covering a floor area only 9 sq. ft.

Linking facilities are provided so that one of a pair of half-units can be isolated, while attention is given to circulating fans or any other item, and the remaining half continues to give its 750 kW. output, the rectification then being temporarily six-phase. Removable gantries can be readily fitted to the cubicle framework for access to the bulbs and starter units.

A.C. Switchgear

The high voltage switchgear is by Switchgear & Cowans Limited, and consists of a bank of 14 type FB.31, vertical isolation, compound-filled units rated for 11,000 V.; these cater for three incoming feeders, seven rectifiers, two bus-section switches, one outgoing feeder, and one lighting transformer feeder. Space is available for an additional unit, if required. The switchboard is divided into three sections. Solenoid closing is provided for all the circuit breakers, which are fitted with arc control devices and have a tested rupturing capacity of 350 MVA.

Protection on the incoming feeders is by Translay relays, together with back-up protection, comprising inverse time overload and earth leakage relays. There is also frame earth leakage protection. Each incoming feeder has a voltmeter, ammeter, and kWh.-meter. The rectifier circuit breakers have over current and earth fault protection and means for remote load indication.

Modernisation of this substation has entailed the provision of three new 11-kV. 0·25 sq. in. three-core, paper insulated, lead alloy sheathed, feeder cables from Aldgate to Charing Cross via the District Line tunnels, together with a pilot cable for Translay protection purposes. These cables were supplied by W. T. Glover & Company, and installed by London Transport staff.

Traction Switchgear

The d.c. 630-V. switchgear is in two banks, the positive circuit breakers in one and the corresponding negative contactors in the other. The two banks face each other, and the sequence of the units is so arranged that the positive circuit breaker faces its corresponding negative contactor. This equipment was supplied by Bertram Thomas (Engineers) Limited, of Manchester, and comprises truck-type draw-out units. There are 25 cells in each bank but two are skeleton units and will be equipped if and when the other two rectifier sets are installed. One pair of these cells contains emergency trucks for use as temporary replacements in case of a fault or damage to the equipment of any other track feeder unit. The rating of the circuit breaker and contactor on these standby trucks is 3,000 A.

Both the circuit breakers and the contactors are electrically closed, the former being of the high-speed type. Those for the rectifiers are rated at 4,000 A. while the outgoing feeders are 3,000 A. The former trip only on reverse current—which would result from a fault in the associated rectifiers—and the tripping of any one of these opens the associated high-voltage a.c. breaker. The feeder circuit breakers do not reclose automatically after tripping on a fault or overload, but give an alarm at the controlling point; the operator then restores the supply at his discretion. The circuit breakers are closed by push-button control and latch in, the negative contactor following automatically. Similarly, on opening, the contactors follow the breakers, since their closing and holding circuits are completed via auxiliary contacts on the circuit breaker.

Two pairs of couplers of 4 000 A. rating divide these twin switchboards into three sections, and in the first instance two rectifier sets will feed

High voltage a.c. switchgear

into each section. Sections 1 and 3 have additional skeleton housings for the future rectifier units referred to previously. Section 1 has feeder circuit breakers supplying two northbound and two southbound sections of the Northern Line, and section 2 supplies four similar lengths of track on the Bakerloo Line. The east and westbound tracks of the District/Inner Circle Lines are supplied from section 3.

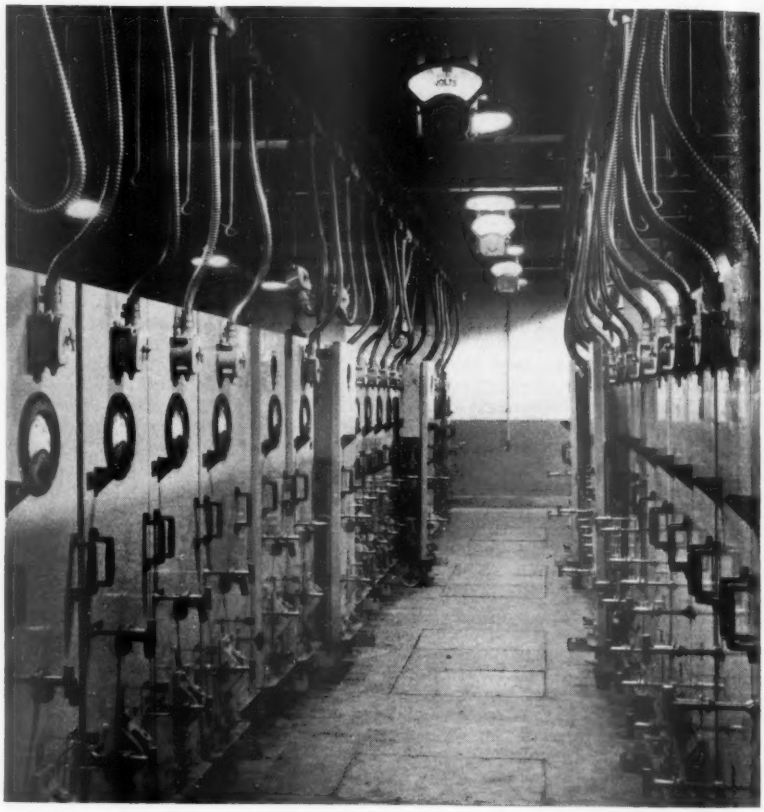
Section 1 also gives a feed to the lifts and escalators on the Northern Line, while sections 2 and 3 give similar feeds to a small bank of enclosed switchgear standing adjacent to the end of the negative contactor bank. This switchgear is also by Bertram Thomas (Engineers) Limited but, in this case, the circuit breakers are of the semi-high speed type, single pole, with accompanying negative contactors. There are two separate lengths of 630 V. busbar; one supplies lifts and escalators on the Bakerloo Line, while the other feeds pumps and escalators on the District Line.

Each section of the main d.c. switchboard has its own voltmeter, mounted over the central gangway between the two banks, and each length of positive and negative busbar has surge arresters for discharging to earth any surge voltages that may develop on the system. These have fuses capable of breaking the follow-through current should the arrester fail. An isolating switch ensures safety when replacing a fuse. Each negative busbar has an earth fault relay.

As both poles of the system are normally fully insulated, any considerable current leakage from the positive pole will lead to an increase in potential between the negative pole and earth. If this is of sufficient magnitude, the relay will operate and give warning that a fault has developed. This facility assists in locating faulty trains. Test panel equipment for the positive and negative d.c. trucks is mounted on the side wall of the building in a convenient position.

Lighting Switchboard

For the time being, a low voltage a.c. supply for station lighting and auxiliary purposes is obtained from an existing group of three single-phase transformers in the old substation at 220 V., 33⅓ cycles, but later the system is to be standardised at 415 V., 50 cycles, four wire, and fed from a transformer to be installed in the new building. The new switchboard is designed for the future conditions, although operating temporarily on the existing system; it is located on the upper floor and incorporates six double-tier units of the draw-out type manufactured by Switchgear & Cowans. The incoming circuit breaker is rated at 1,200 A., and the feeder circuit breaker at 400 A.; they are of the air-break type and supply the Signal Engineer's distribution mains. A system of couplers and isolators is included in the switchboard, so that any of these vital lighting feeders can be fed from an adjacent circuit, should its own circuit breaker require attention, or for convenience of maintenance.



Modern track-type d.c. switchgear; positive (left) and negative (right)

The remainder of the switchboard consists of fuse-switches for air compressors, main ventilating fans, a signals transformer, substation lighting, heating and battery chargers, and future additional services.

Facing this switchboard is the signal switchboard, which is in two sections. One portion operates at 600 V. single phase, and is fed from a transformer in the old substation for supplies to District and Bakerloo Lines; the other gives a 440 V. supply for the Northern Line and for tunnel telephones.

The frequency of the supply to all signalling equipment will be maintained at 33⅓ cycles after the main conversion to 50 cycles; this is to prevent inadvertent operation of signals by possible fault current from any 50 cycles power supply system. The retention of the 33⅓ cycles supply will necessitate the installation of motor generators or some other form of frequency-changer at a later date.

Auxiliary Equipment

Most of the auxiliary equipment, including the battery chargers and distribution switchboards, is also installed on the upper floor. Batteries are in a separate room with the Signal Engineer's telephone batteries.

The track feeder, escalator, lighting, and pump feeder cables, which are the responsibility of the Signal Engineer, are being lengthened and re-routed to the new substation; the new cabling is paper-insulated and lead covered, and is of the pre-impregnated, non-bleeding type.

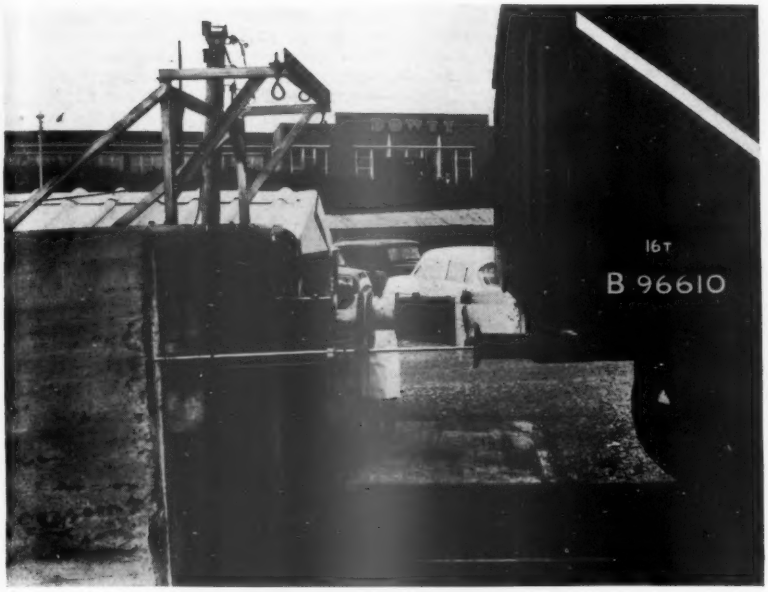
Track feeder cables are 1·4 sq. in. single-core, escalator cables 0·4 sq. in. concentric, while the lighting cables are three-core 0·25 sq. in. shaped conductor cables. A mechanical sealing end, developed by the Signal Engineer, is being used for terminating the track end of each track feeder cable. Due to limited clearances, the existing cable runs are being used and modernised where necessary. The cables were manufactured by W. T. Glover & Co. Ltd. and installed by London Transport.

The substation control cabling is carried in sheet-steel trunking, and carefully planned marshalling cabinets, at one end of each line of d.c. truck switchgear, facilitate the installation, checking, and testing of the control and indicating circuits in the substation. The final control marshalling cabinet is situated on the upper floor adjacent to the rectifier relay board. Without these marshalling arrangements, the changeover of the traction current feeds from the old substation to the new would be virtually impossible

(*Continued on page* 424)

Hydraulic Buffer for Wagons

Efficiency and economy claimed for design based on experience with aircraft landing gear



Test rig using electronic strain gauge equipment

THE design of the Dowty hydraulic buffer is derived largely from those of various hydraulic shock absorbers for aircraft landing gear, and based on experience therewith. Although the problem of arresting the motion of a freight wagon with the minimum of shock is basically similar to that of absorbing as quickly and as smoothly as possible the landing impact of an aircraft, the railway hydraulic buffer must be low enough in cost to justify its use in large quantities and must continue to function efficiently for several years with the minimum of attention.

Fig. 1 shows how these problems are being dealt with in the Dowty unit. The shank of the buffer head which forms the piston is screwed and pegged to the head, so forming a rigid attachment, but allowing a standard shank to be used with alternative heads. Manufacture of these components is considerably facilitated and cheapened by the use of two parts. In a similar way and for similar reasons the cylinder in which the piston slides is also screwed into the rectangular mounting flange. A conical seating is provided for the cylinder and to ensure that no leakage occurs at this joint an "O" sealing ring is trapped between the joint faces.

Hydraulic Reservoir

Surrounding, and extending for the length of the cylinder, is the hydraulic reservoir. This is a solid drawn tube, welded to the back plate and shrunk on to the cylinder at the front end. The tube is mounted eccentrically to the cylinder, with the wide section of the annulus at the top to form an air cushion chamber. At 45 deg. to the vertical axis is the filler plug boss; this position automatically prevents overfilling and so maintains the correct volume of air.

A single low-rate recoil spring is carried inside the piston. This spring is made from ground bar, operates at a low stress range, and has practically unlimited life. The outstop for the piston is provided by a shoulder on the piston which makes contact with a split abutment ring fitted in a recess at the front of the cylinder; the split ring is retained by a stainless steel circlip.

Sealing of Piston

Sealing of the piston against leakage is obtained by the fitting of a synthetic rubber "O" ring, backed up by a rectangular section nylon ring in the same groove. To ensure that this seal is not subject to high pressure, a high pressure leakage groove, connected by drilled holes to the reservoir, is placed on the pressure side of the seal.

The surface of the piston is chrome plated and polished and operates with

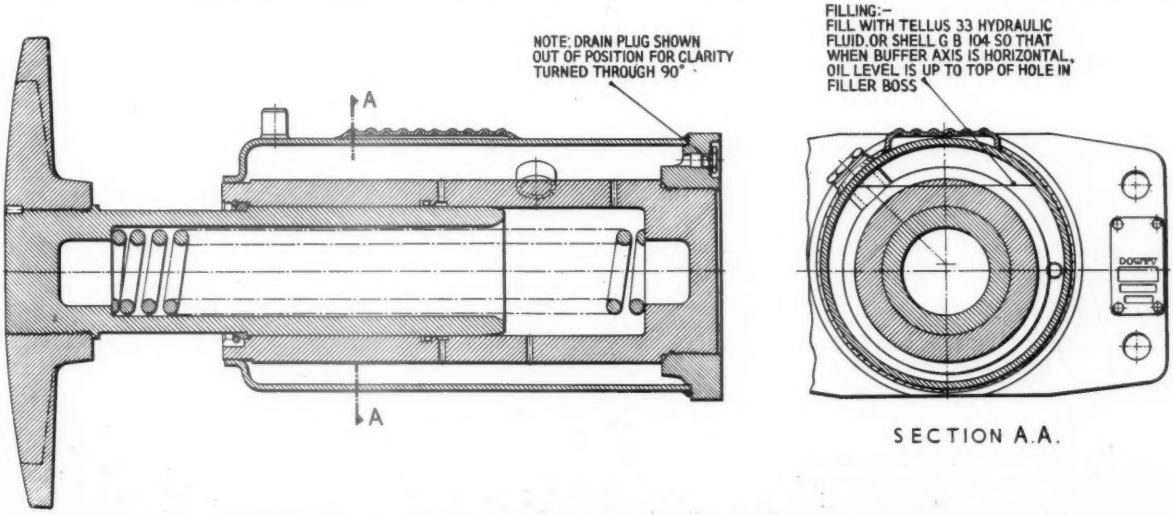
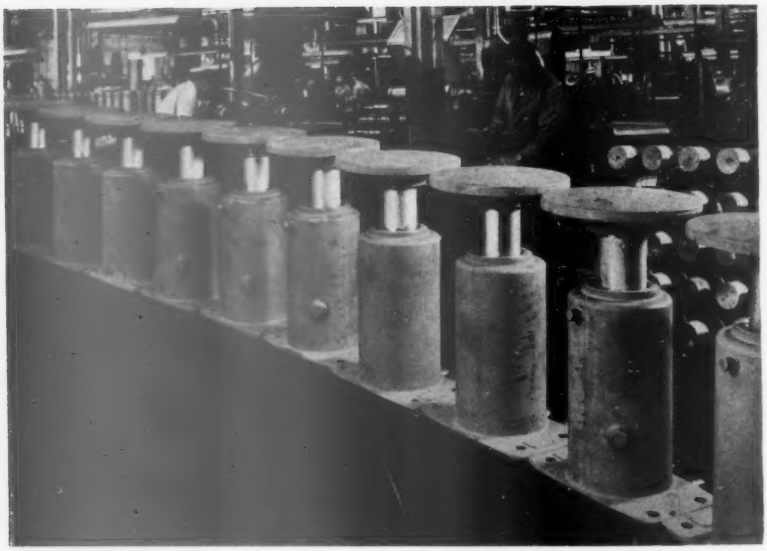

NOTE: DRAIN PLUG SHOWN OUT OF POSITION FOR CLARITY TURNED THROUGH 90°
A
A
FILLING:–
FILL WITH TELLUS 33 HYDRAULIC FLUID OR SHELL G B 104 SO THAT WHEN BUFFER AXIS IS HORIZONTAL, OIL LEVEL IS UP TO TOP OF HOLE IN FILLER BOSS
DOWTY
SECTION A.A.

Fig. 1—Sectional arrangement of hydraulic buffer, showing reservoir and filling plug



Hydraulic buffers moving to despatch bay after pressure testing

a diametral clearance of ·004/·006 in. in the cylinder. The exposed portion of the piston attached to the buffer head is reduced in dia. to prevent contact with the cylinder bore; in addition the outstop ring acts as a wiper.

Action on Impact

When an impact on the buffer head forces in the piston, oil is discharged from the cylinder through a series of drilled holes into the reservoir. The resistance of the buffer to closure is obtained from the restriction to flow through the holes, the amount of restriction being proportional to the speed of flow. As the piston approaches the end of its stroke some of the holes are covered, thus providing an increased resistance where it is most required.

When the oil is forced through these small orifices the pressure energy is dissipated as heat and not just stored up as in a spring buffer, to be released in the form of a violent recoil.

This feature of automatic variation of buffer resistance according to the speed of impact, which is clearly shown in the performance curves (Figs. 2 and 3), is due to the fact that resistance to flow through an orifice increases as the square of the fluid velocity in exactly the same way as the force of impact increases as the square of the wagon speed.

When the fluid is displaced from the cylinder into the reservoir, the air, which is at atmospheric pressure, is compressed slightly. This pressure is used to return the oil to the cylinder on recoil. Excessive speed of recoil is prevented by the flow resistance of the ports into the cylinder.

Durability

The buffer is made throughout in high-grade steel of robust proportions, but without excessive weight. Development testing included many thousands of shunts over a range of speeds and wagon weights and also a considerable amount of side loading with impacts up to 3 in. out of alignment. Fluid leakage both on test and in service has been very slight, this being largely due to the absence of any internal pressure in the buffer in the normal position. The fluid capacity is 10 pints, which is 1½ pints above that required to fill the cylinder. Tellus 33 or Shell 104 are the makers' recommended oils.

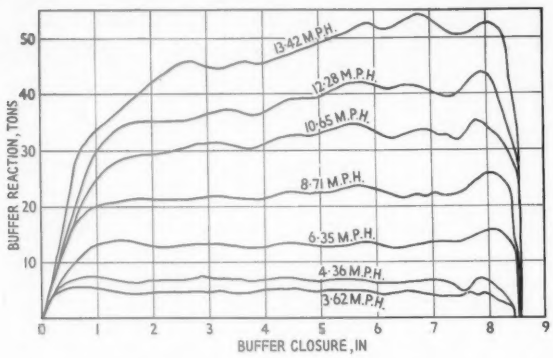


Fig. 2—Automatic variation of resistance to speed of impact between Dowty hydraulic buffers

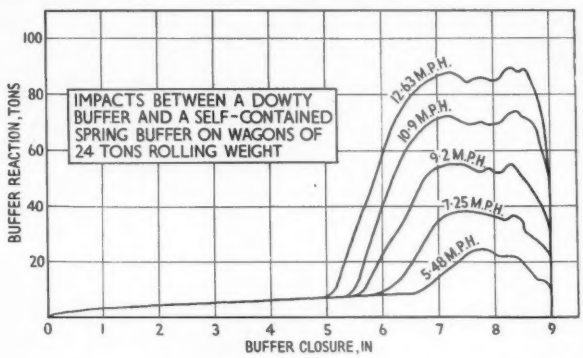

IMPACTS BETWEEN A DOWTY BUFFER AND A SELF-CONTAINED SPRING BUFFER ON WAGONS OF 24 TONS ROLLING WEIGHT
BUFFER REACTION, TONS
BUFFER CLOSURE, IN
12·63 M.P.H.
10·9 M.P.H.
9·2 M.P.H.
7·25 M.P.H.
5·48 M.P.H.

Fig. 3—Reaction of impact between hydraulic and self contained spring buffers

New Substation at Charing Cross, London Transport

(*Concluded from page* 422)

during the few night hours when train services are suspended and the station can be shut down.

Changeover

As the substation serves three separate Underground lines, the changeover from the old to new cannot be carried out overnight. Instead, the track feeders are being dealt with one at a time, and only at week-ends, when longer track possessions are possible. So far, the four sections of the District Line have been changed over and are now fed from the new substation. The Northern and Bakerloo lines will be changed over subsequently.

All the new equipment is temporarily remote-controlled from the old substation by a centralised control panel, which was designed and produced by London Transport staff. In the near future permanent control panels will be installed in a control room, on the upper floor of the new building. These panels will also provide remote-control for the rotary converter substation at Lambeth, which has hitherto been controlled from the old Charing Cross substation. This work is being carried out by London Transport staff. Space is available for similar equipment for the remote-control of four or five other substations.

It is expected that the last of the traction feeds will be connected to the new substation early in 1958, but completion of the connection of the auxiliary supplies will not be possible before next Spring.

RAILWAY NEWS SECTION

PERSONAL

H.M. the King of Denmark has conferred on Mr. C. K. Bird, C.B.E., General Manager, Eastern Region, British Railways, the decoration of Commander of the Royal Order of the Dannebrog and on Mr. F. A. Gilberthorpe, Regional Catering Superintendent, Eastern Region, that of Knight of the Royal Order of the Dannebrog.

Mr. S. A. Claydon, Deputy Shipping Manager & Port Superintendent, Harwich, Eastern Region, British Railways, who, as recorded in our September 27 issue, has been appointed Continental Traffic & Shipping Manager, Eastern Region, Liverpool Street, was educated at Brentwood School. He entered the Goods Department of the L.N.E.R. in 1927, and was transferred to the Continental Traffic Manager's office in 1930. He became a Traffic Apprentice in 1936 and received his training in the Southern Area of the L.N.E.R. He was appointed Supernumerary Assistant to the District Superintendent Cambridge in 1939, in which year he was commissioned into Royal Engineers Movement Control, subsequently serving in France and the Middle East, North Africa, and Europe, in Transportation Units and Movement Control as D.A.D.Tn. On resuming railway service Mr. Claydon returned to the Operating Department and served in the Stratford, Manchester, Doncaster, and Nottingham Districts and as Operating Member of the Eastern Region Branch Lines Committee, before appointment as Assistant District Operating Superintendent, Leeds, in 1950. He held that position until 1952 when he took up the appointment of Assistant Manager (Shipping Services) at Harwich. Mr. Claydon was appointed Deputy Shipping Manager & Port Superintendent, Harwich, in January, 1956.

Mr. D. Paton, Assistant Works Accountant, Doncaster, Eastern Region, British Railways, has been appointed Works Accountant, Doncaster.

Mr. Alfred Kenyon, Staff Assistant to the Operating Manager, Euston, London Midland Region, British Railways, is retiring.

Mr. H. E. Everitt, Stationmaster at Fenchurch Street, Eastern Region, British Railways, has retired after 46 years of railway service. He has been succeeded by Mr. W. A. Burch, Stationmaster at Laindon, Essex.

Mr. T. G. Neil, Staff Assistant to the Motive Power Superintendent, London Midland Region, British Railways, who, as recorded in our October 4 issue, retired on September 30 after more than 51 years of service, began his career on the former Lancashire & Yorkshire Railway in the office at Bank Hall Motive Power Depot, Liverpool, in 1906. During the 1914-18 war he served with the Royal Artillery in France and Belgium, later resuming his railway duties in Liverpool where he became Chief Clerk in 1923. In 1935 he was transferred in the same capacity to Patricroft Motive Power Depot, Manchester, and, in 1940, became Staff Inspector on the Western Division of the L.M.S.R. In 1941 he joined the Motive Power Headquarters staff at Watford as Chief Staff Clerk. This was followed by appointments as Assistant (Staff) to the Motive Power Superintendent and in January, 1956, Staff Assistant to the Motive Power Superintendent, London Midland Region. Mr. Neil was a member of the London Midland Sectional Council No. 2, on which he was also Chairman of the sub-committee. Among presentations received before his retirement was one from members of this Sectional Council.

British Transport Docks announces that Mr. E. S. Lickfold has been appointed Staff Assistant, Southampton Docks. Mr. Lickfold began his career in 1917 with the former London & South Western Railway. After serving in the Dockmaster's Section he was transferred to the Wharfinger's Office where he was promoted to the position of Senior Clerk. He ultimately became Assistant to the Wharfinger, in which capacity he was responsible for the passenger and cargo operations of a section of the docks. In 1941 the Outdoor Superintendent's Department was created as a result of reorganisation and Mr. Lickfold was placed in charge of the departmental Staff & Labour Section. With the development of postwar commercial activities, Mr. Lickfold was transferred to the Docks & Marine Manager's Staff Section.

Mr. Dick Stockings, A.M.I.Loco.E., who, as recorded in our September 27 issue, has been appointed Diesel Assistant to the Motive Power Superintendent, Eastern Region, British Railways, received his technical education at Norwich and was apprenticed to Laurence, Scott & Electromotors, where, as a draughtsman, he worked on the mechanical design of traction motors and generators. Later he became associated with Ruston & Hornsby Limited as a draughtsman in the Locomotive Section where he was concerned with standardisation of locomotive design. From 1943 to 1945 he served with Davey, Paxman & Co. Ltd., working on the general design of all types of medium and high-speed diesel engines. In 1946 he joined the English Electric Co. Ltd., at first concerned with contract work on diesel-electric locomotives and later designated Traction Liaison Engineer. He returned to Davey, Paxman & Co. Ltd. in 1953 as Traction Sales Manager. He entered railway service in May, 1956, when he became Diesel Assistant to the Motive Power Superintendent, London Midland Region, Euston, the position he now vacates.

At the request of the International Bank for Reconstruction & Development, Mr. Andrew H. Earley, Chief Ports Manager, East African Railways & Harbours, is to advise on transportation problems in Thailand. Mr. Earley will join a survey mission now assisting the Thailand Government on planning long-range economic development. He will leave East Africa on October

Mr. S. A. Claydon

Appointed Continental Traffic & Shipping Manager, Eastern Region

Mr. T. G. Neil

Staff Assistant to Motive Power Superintendent, L.M. Region, 1956-57

Mr. Dick Stockings

Appointed Diesel Assistant to Motive Power Superintendent, Eastern Region

15 and is expected to be away for from five to six months. Mr. J. F. C. Williams, Port Manager, Mombasa, will act as Chief Ports Manager during Mr. Earley's absence, Mr. F. R. F. Broomhead will act as Port Manager, Mombasa. The International Bank Survey Mission will make recommendations concerning a public investment programme for the next five or six years covering the major sectors of Thai economy. Mr. Earley will advise on rail, road, inland water and, to a certain extent, air transportation, and sea ports. The mission is led by Dr. Paul T. Ellsworth, Professor of Economics at the University of Wisconsin; the full-time members are: Mr. William T. Gilmartin (American)—Chief Economist; Mr. Romeo Dalla-Chiesa (Italian)—Economist; Mr. G. M. Bacon (British)—Adviser on Agriculture, and Mr. Norman Lees (British)—Technical Adviser. Other short-term advisers who are expected to join the mission will deal with water resources, social services and, possibly, public finance.

The British Transport Commission announces the following appointments:—

General Staff of the Commission

Mr. A. J. Ives, Traffic Costing Officer, Liverpool Street, London, to be Traffic Costing Officer (Great Northern Line), Liverpool Street, London, Finance Department, Costings Division.

Mr. G. W. Hollowell, Senior Executive Assistant, Secretary's Department, London Transport Executive, to be Assistant, Principal Officer (Administration), General Duties Department.

British Railways Central Staff

Mr. J. F. H. Tyler, Assistant Signal Engineer, Western Region, British Railways, to be Assistant Signal Engineering Officer, Signal Engineering Department.

Mr. James Scott, District Engineer, Edinburgh, Scottish Region, British Railways, retired on September 30.

Mr. J. H. C. Pape has now taken up his duties as Assistant General Manager of the National Dock Labour Board.

The Tilling Group announces that Mr. R. G. Howe, Assistant General Manager & Traffic Manager of the United Counties Omnibus Co. Ltd., has been appointed Director & General Manager of the Southern Vectis Omnibus Co. Ltd., with effect from November 1 next, succeeding Mr. R. F. Bushrod, recently appointed to a similar position in the Lincolnshire Road Car Co. Ltd.

We regret to record the death on September 28, at the age of 65, of Mr. B. V. Smith, Director & General Manager of the Western & Southern National Omnibus Companies. He began his transport career in 1918 with the Birmingham & Midland Motor Omnibus Co. Ltd. as Rolling Stock Superintendent, with which company he became Assistant Engineer in 1920. In 1924 he joined the United Automobile Services Limited as Chief Engineer, and, from 1928 to 1930, was also Operating Manager of that company. In 1936 he was appointed General Manager of the Western & Southern National Omnibus Companies with headquarters at Exeter, and became Director & General Manager of these companies early in 1949.

Lord Aberconway has been appointed Chairman of Sheepbridge Engineering Limited, succeeding Mr. A. V. Nicolle, who has resigned on reaching the age of 65. Mr. Nicolle is remaining on the board of the company.

Mr. G. S. Townsend has resigned his directorship of Alfred Herbert Limited.

Mr. L. E. P. Tylor has joined the board of Ruston-Bucyrus Limited.

Admiral Robert Spencer Warne has been appointed a director of Ransomes & Rapier Limited.

Commander Michael B. St. John has been appointed Managing Director of Liquid Systems Limited.

Sir Roy Dobson, Director of the Hawker Siddeley Group Limited, has been elected Deputy Chairman of the Brush Group.

Mr. Alan Graham has been appointed Assistant General Manager (Castings) of High Duty Alloys Limited.

Mr. C. W. Sharp, Managing Director of Conveyancer Fork Trucks Limited, is leaving this country on October 22 for a three-month world tour.

Mr. R. A. R. Bottone, head of the Industrial Sales Department, British Thomson-Houston Co. Ltd. since 1942, retired recently. He has been succeeded by Mr. F. C. Lucas.

Lt.-Colonel C. P. Dawnay, Chairman of the Gloucester Railway Carriage & Wagon Co. Ltd., has been appointed a director of Electrical & Musical Industries Limited.

We regret to record the death on October 4 of Mr. Percy Ashworth. Buyer for Taylor Bros. & Co. Ltd., Mr. Ashworth had recently completed his fortieth year of service with that company.

Cravens Limited announces the appointment of Mr. E. T. White as Deputy Managing Director. Mr. E. Allsop, who was appointed to the board in 1952, has retired after 52 years of service with the company.

Mr. W. W. Vinson, Director of Manufacture of the British Thomson-Houston Co. Ltd. since 1945, is retiring at the end of this year. His present deputy, Mr. H. L. Satchell, will take over as Director of Manufacture as from October 1 this year.

Mr. L. A. Rochefort and Mr. A. C. Cooper, chief executives of I.T.D. Limited, went to the U.S.A. on September 17, 1957, to visit units of Clark Equipment International C.A. consequent on the recent acquisition of a third interest in I.T.D. Limited by Clark.

Mr. R. P. Crawshaw has been appointed General Sales Manager of the United Steel Companies as from October 1. He will continue as Chief Purchasing Agent. He succeeds Mr. H. M. Henderson, who is leaving this country to take charge of the company's interests in Patchett Steel Construction (Pty.) of Cape Town.

Sir George Beharrell has resigned from the Presidency of the Dunlop Rubber Co. Ltd. Although he leaves the board, he wil continue to act as an honorary Consultant to the company. Lord Baillieu asked to be relieved from his duties as Chairman. He will succeed Sir George Beharrell as President Mr. G. E. Beharrell was elected Chairman and will continue as Chief Executive of the company. Mr. John H. Lord was appointed a Managing Director. He expressed his wish to retire from executive work about the end of 1958 but agreed to serve after that date as a non-executive member of the board. Mr. R. M. Geddes was appointed a Managing Director, and Mr. T. E. Peppercorn an Executive Member of the board.

D. Napier & Son Limited announces the appointment of Mr. J. C. L. Southam as Deputy Commercial Manager (Diesel). In this capacity he will be responsible to the Commercial Manager, Mr. R. M. Hilary, for the direction and supervision of the company's Deltic and Turbo-Blower Sales Departments. Mr. J. H. Barker succeeds Mr. Southam as Sales Manager, Turbo Blowers.

Alldays & Onions Limited announces that Mr. J. S. Erskine has been appointed Sales Manager of the company, from October 1.

Purchasing Officers Association

The following have been appointed Officers and Members of Council of the Purchasing Officers Association for 1957-58:

President: Mr. H. C. Exell, North Thames Gas Board.

Executive Vice-President: Mr. C. F. Huebner, British Oxygen Co. Ltd.

Vice-Presidents: Messrs. I. Faulkner, L. H. Newton & Co. Ltd.; J. M. Grammer, National Coal Board; F. Kay, Forestal Land, Timber & Railways Co. Ltd.; J. McCallum, Mavor & Coulson Limited; J. M. Parkes, Kayser Ellison Limited.

Committee Chairmen: General Purposes & Finance Committee: Mr. A. H. Thomas, British Belting & Asbestos Limited; Development Committee: Mr. T. L. Garner, Precision Rubbers Limited; Publications Committee: Mr. F. Kay, Forestal Land, Timber & Railways Co. Ltd.; Education Committee: Mr. H. L. Beddowes, Pilkington Brothers Limited; Economic Survey Committee: Mr. A. Elliott, Precision Rubbers Limited; Conference & National Functions Committee: Mr. H. C. Exell, North Thames Gas Board.

Institution of Locomotive Engineers

The following awards have been made by the Institution of Locomotive Engineers:—

Frederick Harvey Trevithick Award

To Mr. A. Campbell (Past-President) for his paper "Unification of Freight Vehicles on Oversea Railways."

Institution of Locomotive Engineers Award

To Mr. F. Fancutt (Non-Member) for his paper "Painting and Cleaning of Rolling Stock."

Alfred Rosling Bennett Award

To Mr. F. J. Pepper (Member) for his paper "Some Considerations of the Problem of Heating British Railways Coaches."

Charles S. Lake Award

To Mr. G. F. Parker (Associate Member) for his paper "Engineering Training in the Main Workshops of British Railways."

Special Award

To Mr. T. F. B. Simpson (Non-Member) for his paper "Diesel Locomotive Building and Maintenance."

Stewart-Dyer Awards

To Mr. S. Van Dorp (Associate Member) and Mr. G. W. Graham (Graduate) for their paper "Modern Methods of Train Performance Calculation" to Mr. R. Krishnaswamy (Member) for his paper "Certain Aspects of Goods Train Operation."

President's Prizes

To Mr. C. P. Boocock (Graduate) for his essay on the Institution's Visit to the Fawley Refinery of Esso Petroleum Co. Ltd. on May 3, 1957; to Mr. F. Rich (Graduate) for contributions to discussions on papers presented at meetings of the Institution's Midlands Centre.

NEW EQUIPMENT AND PROCESSES

Flexible Metallic Hose Applications

APPLICATIONS of Plessiflex, metallic, seamless, flexible hose to railways, include steam heating flexible connections; the metallic hose is used in place of the conventional armoured reinforced hose.

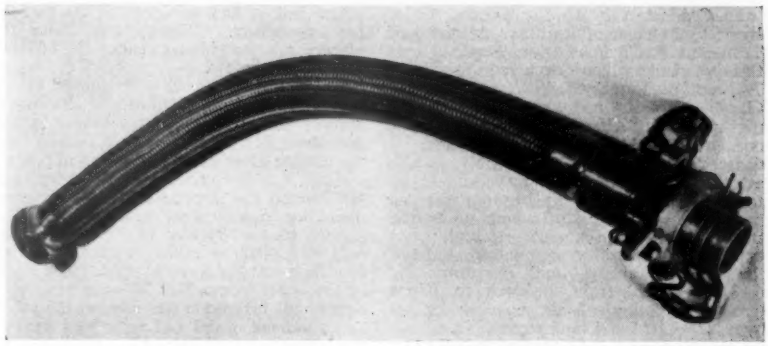
An advantage claimed for general use is that the seamless construction, which is of spiral and not bellows configuration, ensures constant strength and flexibility, that it can carry liquids or gases at high and low temperatures, and that being of metal construction throughout, there are no seals to deteriorate and leak.

In the case of the steam heating application, particular advantages compared with normal materials are stated to be that it is non-perishable, thus giving an increased working life, it has greater strength thereby withstanding more abuse, and an adequate working pressure safety factor.

Plessiflex is available in stainless steel, brass, copper, Monel, Inconel and so on. End fittings may be silver soldered to the hose, or if desired, special techniques have been developed that enable end fittings to be satisfactorily welded onto the hose unit. For this particular application, standard railway steam heating hose fittings would be fitted to the product by manufacturer.

A similar hose has also been developed for vacuum brake connections and smaller seamless hoses have been developed for conveying lubricant to locomotive axleboxes. This latter application is stated to be probably one of the most severe tests that a flexible hose can be expected to withstand as the hose is subjected to intense vibration, rapid flexing, high temperature and bombardment by stones and hot cinders. These hoses are at present undergoing service trials under operating conditions and have been in use for about a year. The illustration shows a vacuum brake connection pipe which incorporates the product.

The manufacturer, Power Auxiliaries Limited, Kembrey Street, Swindon, Wilts, would welcome enquiries from railway authorities regarding these or similar applications.



Continuity Planning Chart

THE difficulty of preserving continuity with wall charts where progress is being plotted over a period of time has been solved by the Rotadate continuous chart.

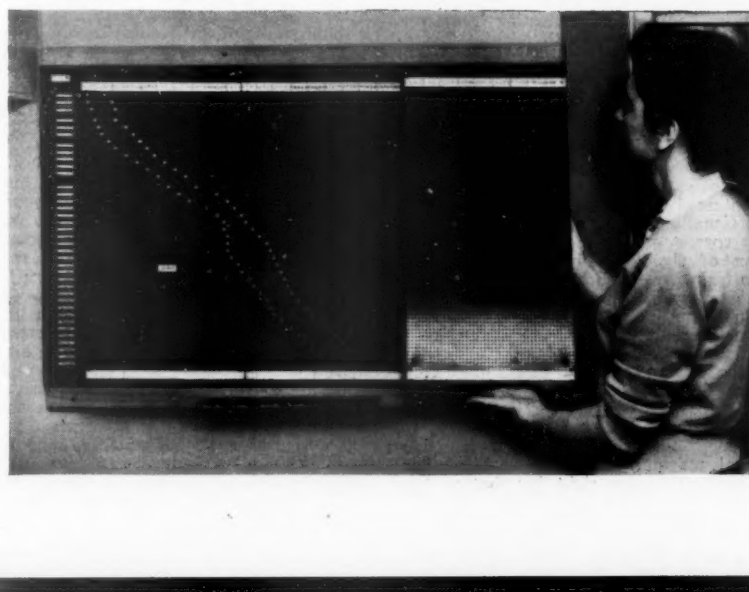
This addition to the Movigraph range of wall charts enables a process or state to be charted over a current period. The system comprises a number of panels, the actual number being determined by the length of period required. These fit into two horizontal channelled wooden sections which are screwed to a wall. Each individual panel can easily be removed or inserted.

When the period covered by the panel at the extreme left of the system has expired, that panel is removed. The remaining panels are then pushed towards the left, sliding along the channels, leaving a gap which is filled by a fresh panel representing a new period. The elasticated flowlines automatically adjust themselves. That portion of the chart which holds title frames is separate and permanently fixed.

The size of the chart can be varied to suit the kind of information which is being charted, and the length of the period which it is required to review. The manufacturer's standard design of perforated panels, enabling various signals to be inserted, is used. The illustration shows the panels of the chart being changed.

Another new innovation is a series of interlocking plastic trays, an optional extra which is screwed to the bottom channelled section. These trays are for holding signals and so on.

Price of the chart is from £30 upwards, according to size. The equipment is manufactured by Adapta-Charts Limited, 129, Hammersmith Road, London, W.14.

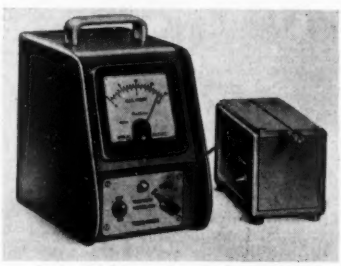


Surface Finish Measurement

AN instrument for measuring surface finish has been introduced under the name Talysurf 100. The instrument has been designed as a workshop testing tool, and it is claimed that it can be used in the production line, no special skill being required, giving on-the-spot tests with results within about three sec.

The Talysurf 100 consists of a work table and a gearbox and pickup, housed together in a box measuring 7¼ in. × 3¾ in. × 4¾ in.; and a compact average meter and amplifier housed in one case. Both can easily be transported from place to place by hand and plugged into the available electricity supply.

The new instrument employs a sharply-pointed stylus to traverse the profile of surface irregularities over a set length of the workpiece. The movement is translated into electrical terms, amplified and registered through the average meter. This



meter shows the centre line average (CLA) index of all irregularities. The index is standard in Great Britain, America and Holland, and is being introduced into other European countries.

The manufacturer is Taylor, Taylor & Hobson, Stoughton Street, Leicester.

Ministry of Transport Accident Report

Welwyn Garden City, January 7, 1957; British Railways, Eastern Region

Lt.-Colonel G. R. S. Wilson, Chief Inspecting Officer of Railways, Ministry of Transport & Civil Aviation, inquired into the accident which occurred at about 7.12 a.m. on January 7, 1957, near Welwyn Garden City station, when the 7.10 p.m. night express, Aberdeen to Kings Cross, consisting of 11 bogie coaches drawn by Class "A" 2/3 4-6-2 engine, No. 60520, attached at Peterboough, travelling at 60 to 65 m.p.h., failed to observe the up main line signals, all of which up to the station itself were against it, and, after exploding emergency detonators, entered the section ahead and overtook the 6.18 a.m. local train, Baldock to Kings Cross, consisting of six coaches drawn by class "L1" 2-6-4 tank engine No. 67741, which had been turned to the main line on leaving the station and was running at about 30 to 35 m.p.h. and had by then passed the advanced starting signal. (This was actually at clear when the express reached it but was not seen by its driver.) The two rear coaches of the local train were overturned and the last one, in which a passenger was killed, was wrecked; the express engine also was overturned and a considerable amount of damage done. Twenty-five passengers were taken to hospital but five only were detained beyond the first day. The express driver sustained severe shock, being detained in hospital a few days, and there were other cases of minor injuries and shock. Assistance from several sources was quickly forthcoming and passengers from both trains were worked forward later to destination. Traffic was diverted via the Hertford loop line and a shuttle service worked over the Luton single line between Hatfield and Welwyn Garden City. All five tracks were open again under speed restriction after 24 hr. interruption and normal running resumed on January 10 at 4 p.m. In all probability the accident would have been prevented by the British Railways system of automatic train control, under trial along the route for some years. There are track magnets at the main line distant signals between London and Grantham but engine No. 60520 was not one of the comparatively few yet fitted with receiving equipment.

Visibility was approximately 200 yd. and temperature 37° F., with light wind, south-east to south-west. Weather conditions had not been affecting traffic running and the Knebworth District Control had received no reports of signalmen calling for fogmen. The accompanying diagram shows the lines, signals, etc. immediately concerned in the case.

Signalling Arrangements

Interlocking block is in operation with sequential locking and track circuiting, as mentioned on the diagram, ensuring that all signalling operations are carried out in the correct order and proving the restoration of signals behind each movement. No train can be accepted on the up main line unless the arms of the outer distant signals are in the "on" position; in addition the arms of the inner distant No. 31 and outer home No. 34 were all proved at the time and the lever of the inner home also. (As mentioned later the inner distant has since been removed.) The report gives a diagram of the controlling circuits for the main outer distant which is cleared by signal machine when the required conditions ahead are right for that to take place, but it has no lever of its own in the signalbox. Emergency detonator placers are provided outside the box, as referred to below.

Colonel Wilson, with Brigadier C. A. Langley, Inspecting Officer of Railways, accompanied by the Motive Power Superintendent, Mr. E. D. Trask, travelled over the section after dark at 60 to 65 m.p.h. on a class "A 2/3" engine, but in clear weather. He formed the impression that all the up main line signals were well sighted. The pattern of the Welwyn North starting signals with distants below was unmistakable and their oil lights very good. The arms of the outer home No. 34 were very well sighted for far and close view but the green lights did not stand out very well against the rather brighter lights of the inner home gantry where Nos. 33 and 31 were "off."

Photograph showing the wreckage after the accident at Welwyn Garden City

The emergency detonators were exploded but from the driver's (left-hand) side Colonel Wilson heard the sound of what seemed to be a single explosion by no means startling or even loud above the ordinary noise of the engine running downhill under light steam, while Brigadier Langley described the sound heard from the fireman's side as not particularly loud, although he caught a glimpse of the flash of the explosion.

Course of Events and Evidence

The signalman at Welwyn North, a man of 64 and relief signalman for nine years, said it was misty but his fog object was clearly visible; he nad not even thought of sending for fogmen. The local train cleared the section in advance in normal time; he would have expected the man at the Garden City to turn it to the main line at the expense of a check to the express, if necessary. The latter passd at something over 60 m.p h., but not too fast for proper signal observation. At 7.14 he received a message that it had run by signals and a little later news of the accident.

The signalman at Garden City, aged 56, working there regularly for 10 years, also had been able to see his fog object. He accepted the express while the local train was in section, and learning it had passed Hitchin at 7.2 decided to send the local forward on its booked path, and kept his up main signals "on." (The Regional Officers considered he acted correctly, it being the general rule that delays to morning business services should be minimised at the expense of those to night expresses; this one had plenty of recovery time in hand, whereas the local train was allowed none.)

He set the route and signalled the local train to leave the up platform for the main line which it did about 7.10. He had pulled his detonator stirrup on accepting the express and always did so though no rule required it, when stopping a fast train after dark at the outer home with the crossover in question reversed. (The Welwyn North signalman, who happened to be doing duty at Garden City when Colonel Wilson paid a visit to that box said this was his practice also.) Seeing his first track become occupied more quickly than usual the signalman restored the crossover but was surprised to see the train coming by at speed. It exploded the detonators which he strongly maintained had been put on the rail in good time. The telegraph lad showed a red hand signal to the train just after the engine passed. The repeater of the outer distant had returned to caution after the last time it was cleared for the up main otherwise he could not have accepted the express. He noticed both it and the one referring to the outer home showed "on" after the accident. When the express ran by he observed his track indicators in the hope of being able to throw signal 32 "on" between the trains, but as it was he dared not touch the lever.

The telegraph lad confirmed that the detonators were on the rail before the train arrived and that it was normal practice to use them as the signalman described. The station foreman, who was on the up platform, would not call it a bad morning for train working; he could see about 300 yd. He heard the detonators

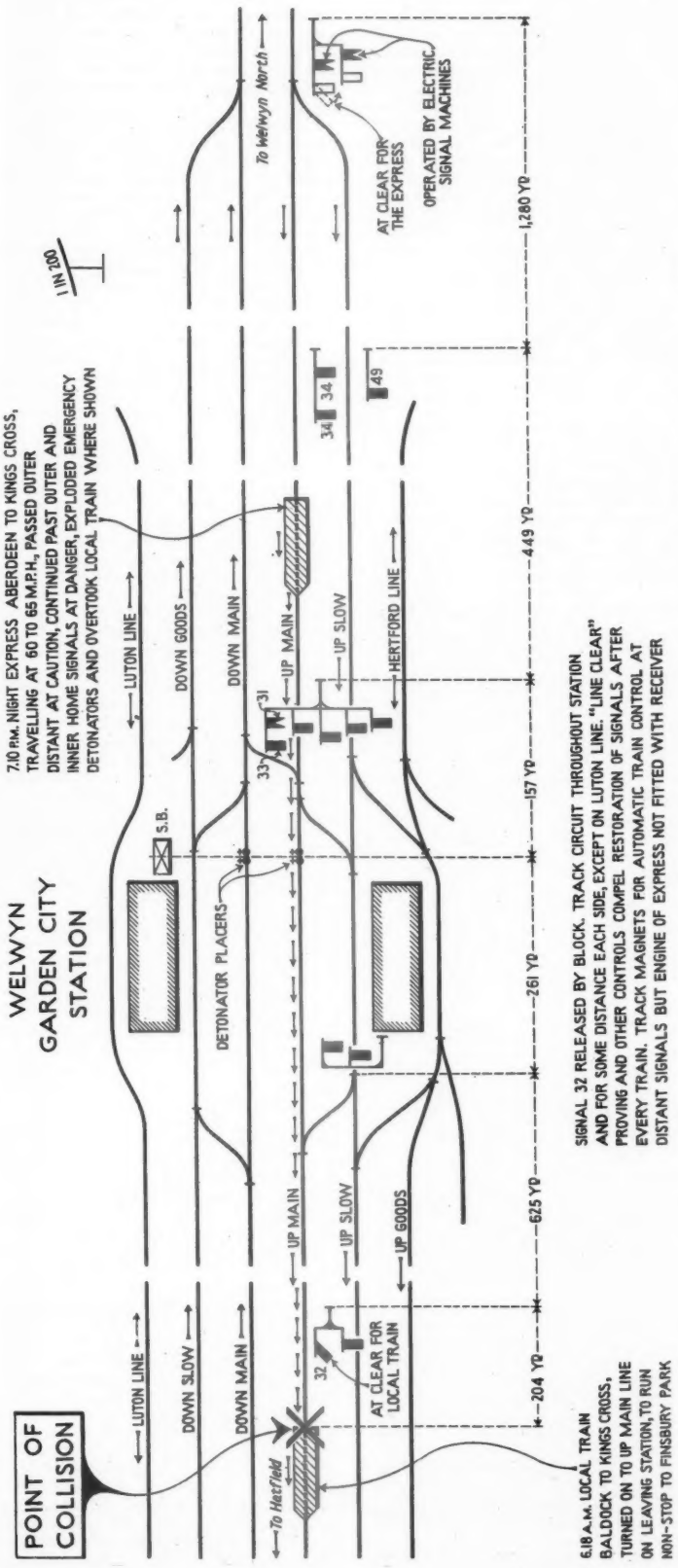

WELWYN
GARDEN CITY
STATION
POINT OF COLLISION
7.10 P.M. NIGHT EXPRESS ABERDEEN TO KINGS CROSS, TRAVELLING AT 60 TO 65 M.P.H., PASSED OUTER DISTANT AT CAUTION, CONTINUED PAST OUTER AND INNER HOME SIGNALS AT DANGER, EXPLODED EMERGENCY DETONATORS AND OVERTOOK LOCAL TRAIN WHERE SHOWN
6.18 A.M. LOCAL TRAIN BALDOCK TO KINGS CROSS, TURNED ON TO UP MAIN LINE ON LEAVING STATION, TO RUN NON-STOP TO FINSBURY PARK
SIGNAL 32 RELEASED BY BLOCK. TRACK CIRCUIT THROUGHOUT STATION AND FOR SOME DISTANCE EACH SIDE, EXCEPT ON LUTON LINE. "LINE CLEAR" PROVING AND OTHER CONTROLS COMPEL RESTORATION OF SIGNALS AFTER EVERY TRAIN. TRACK MAGNETS FOR AUTOMATIC TRAIN CONTROL AT DISTANT SIGNALS BUT ENGINE OF EXPRESS NOT FITTED WITH RECEIVER
LUTON LINE
DOWN SLOW
DOWN MAIN
DOWN GOODS
DOWN MAIN
UP MAIN
UP SLOW
UP GOODS
UP MAIN
UP SLOW
HERTFORD LINE
LUTON LINE
To Hatfield
To Welwyn North
S.B.
DETONATOR PLACERS
AT CLEAR FOR LOCAL TRAIN
AT CLEAR FOR THE EXPRESS
OPERATED BY ELECTRIC SIGNAL MACHINES
1 IN 200
32
33
31
34
34
49
204 YD
625 YD
261 YD
157 YD
449 YD
1,280 YD

Diagram showing circumstances of accident at Welwyn Garden City, British Railways, Eastern Region, on January 7, 1957

but could not say if they went off under the engine's leading wheels.

Colonel Wilson heard evidence from the driver and fireman of the train which passed along the up main before the one from Aberdeen. Their engine was fitted for A.T.C. and a warning was received at the Garden City outer distant, but a clear bell signal on approaching the inner, which the signalman had described as "an accelerating signal." The driver thought the oil lights at these locations good as a rule. The driver of the local train did not consider it a really bad morning. He remembered that both distant signals were on when he was turned to the slow line at Welwyn North starting signals. The Garden City lamps he considered were in order; his evidence was confirmed by his fireman. Their guard happened to be in the fourth coach when the collision occurred and it became separated from the others. Finding the down main fouled he went to his driver who sent his fireman forward.

The driver who should have taken the express was late for duty, although not the fireman, and another took his place, a man of 59 with 38 years service. He had had a long experience, mostly with freight trains, running between Peterborough and Hitchin. He learned the road between the latter place and London in 1956 and said he had acquired a good knowledge previously as a fireman. He seemed to have it, and gave a clear description without prompting of the Garden City distant signals. Shock prevented him from giving evidence until three weeks after the accident, when he said he had a normal journey from Peterborough and saw the outer distant indicating a clear run through Garden City to Hatfield. He missed the outer home and the inner was blotted out by smoke and steam; the next thing he saw was the tail light ahead, which he at first thought was something on the slow line. He did not see signal No. 32, the signalbox, or the station's lights or hear any detonators, but was sure he had not lost his location.

Pressed on various points he persisted that he had seen the outer distant at clear but could not explain why he had not seen the outer home. When he was told he had passed signals at danger he said it was news to him. The fireman had not told him of any signal indication except the clear one at Welwyn North outer distant, a colour-light. The fireman's evidence did not add anything of much real value and the guard admitted he was not looking out after Hitchin: he heard no detonators.

Further Dispute about Signal Indications

On March 8, while the signalman on duty happened to be the one who was at Welwyn North when the accident occurred, this same train from Aberdeen overran the Garden City signals and exploded the emergency detonators. It stopped, however, in the station. Both driver and fireman maintained that the outer distant was at clear for them but neither saw the outer home. (The engine was again a class "A 2/3," not fitted for A.T.C.) The driver said that on seeing the inner home he braked fully and after stopping sent the fireman to the signalbox; he thought signals had been reversed in an emergency.

The signalman said he told the fireman they had overrun, who replied that the distant had been "off" and the home "on." They had some conversation about the previous alleged case of the accident itself. The signalman was satisfied that all signals were properly "on," and had the outer

distant not been he could not have accepted the express. (The indications being given by the repeaters after the accident were confirmed by the telegraph lad.) The signalman knew of no case of malicious or mischievous interference with the signal and declared he had always had every confidence in its working, but driver and fireman maintained their view of the condition of the signals and the former said sight of the outer home had been obscured by steam. No complaint about the signals had been received, however, from other drivers that morning, while two expressly said they had never had any such trouble.

The driver of the express admitted he had not done so previously, but said he had heard others had complained of finding the outer distant clear and being diverted to the slow line at the Garden City, one man actually three times in one week. A guard was said to have seen the outer distant "off" and outer home at danger at the same time and two Kings Cross drivers were said to have received false clear indications. One of these cases turned out to refer to a mechanical signal elsewhere, out of horizontal probably from an overtight wire. On March 14, however, a driver did in fact receive a false clear outer distant indication caused by a lineside fire having burned some cabling and brought circuits into contact; the cables were immediately renewed. Colonel Wilson interviewed a number of men so as to sort out the facts. The evidence he received needs to be read as given in the report for the value and bearing of the various assertions to be understood, but it can be said that there were many contradictions and uncertainties in numerous statements and some evidence that the purpose of the inner distant signal was not properly understood by some drivers. A relief signalman who had worked at Garden City three times a fortnight for seven years was quite satisfied the outer distant had been correctly at "caution" when a driver, who sent in a written complaint, declared it had been "off" with the inner distant "on" on October 23.

Examination and Tests of Signalling Equipment

Colonel Wilson had interviews with the Signal Engineer, Mr. R. A. Green, and several members of his staff to discuss the condition of the control circuits of the up main outer distant and the possibilty of false operation. Tests were conducted immediately after the accident but nothing wrong with any part of the circuits or equipment was discovered. After the incident on March 8, however, a series of tests and investigations of unusual completeness was made, full details of which are given in the report. In addition a special electrical warning indicator was installed, arranged to sound an alarm should either the signal or its controlling relay be in an incorrect condition, but no defect became revealed thereby. Certain equipment was dismantled in connection with the outer home and the circuits on the far side thereof in order to cover every conceivable contingency but nothing which could have led to an irregular clear signal indication was brought to light.

Emergency Detonators

Colonel Wilson considered it advisable to make a special run with a class "A 2/3" engine and two coaches on January 28, 1957, between Hitchin and Finsbury Park at a fairly consistent speed of about 60 m.p.h., to get a practical test of the working of the emergency detonator placers, arranged to be operated at 23 signalboxes, at 11 of them before the train arrived. At the remainder, signalmen were instructed to try to put the detonators on after the leading wheels of the engine had passed. In two cases the detonators were at 24 in. centres, in some others at 6½ in., and in yet others at 3 in., now adopted as standard by British Railways. Results were somewhat varied, but it was shown that it was possible for the explosion of one detonator to pull the other off the rail before it could be crushed. In three instances nothing was heard by the enginemen or an inspector riding with them. In one of these, although the detonators were cleanly exploded, it was thought they might have gone off under the first coach, in which they were heard distinctly, and in another they evidently had fouled some wheels and only one had gone off, probably without full force. It was heard, however, fairly clearly in the first coach. In the other case they were properly exploded by the leading engine wheels and again heard in the leading vehicle but not on the footplate. The machine concerned in the accident had its detonators at 6½ in. centres. The report points out that the specification for machine-type detonators requires not less than 60 grains of gunpowder, compared with the 110-130 for those placed on the rail by hand.

Chief Inspecting Officer's Conclusions

Colonel Wilson points out that the controls would not have allowed the signalman to clear his signals and then change his mind, while his account of the signalling operations was simple and straightforward. His statements in every respect are accepted without hesitation and the conclusion is that all signals up to the station were "on" as the express approached. The signalman was in an unenviable position regarding signal No. 32, cleared for the local train, and did not know whether it would be safe to replace it in an attempt to stop the express, but in any case the driver of the latter did not see it. The signalman is entirely free of responsibility and did all he could to prevent the collision.

If what the driver said about the outer distant was true there must have been a danger side failure of the equipment, or some malicious or mischievous interference, but no defect of a dangerous kind could be found. Such an inexplicable failure would have had to take place in the 4-min. interval between the acceptance of the train and its passing the signal, unless there had been an equally inexplicable wrong side failure in "line clear" circuit to Welwyn North, also found in order. There was no mechanical or electrical defect at the signal itself, nor were any faults found following the very thorough tests made after the incident of March 8. Had there been, then indeed an intermittent and inexplicable failure it must have taken place in an interval of 2 min. only.

Certain of the second, or third hand reports about irregular signal indications were found to be imaginary or irrelevant and the honesty of the driver concerned in the incident of March 8 is doubted, for, were his statements true he must have made a remarkably rapid stop from 60 m.p.h. on catching sight of the inner home, having failed for no good reason to see the outer. The evidence of a guard in support of one of the drivers was plainly untruthful. No doubt the driver who made the written complaint already referred to was straightforward, but Colonel Wilson is satisfied that the whole object of it was to bring to a head his and other drivers disapproval of the new inner distant signal rather than to complain of a failure of the outer distant. Three signalmen, used to working Welwyn Garden City box expressed full confidence in the latter and had never experienced any false clear indication with it.

Colonel Wilson is perfectly satisfied with the honesty of purpose and determination to find any defect which characterised the tests made by the signal department, which proved that the signalmen's confidence was not misplaced. The conclusion is that there was nothing wrong with the signal and that it was properly at "caution" when the express passed. Even had he seen it at "clear" it was the driver's duty—especially so if he had nothing more than a fleeting glance, as he stated—to have observed the other signals but, on his own admission he travelled 1½ miles without seeing any. It is difficult to ascribe this to anything but lack of vigilance under weather conditions requiring some care in observation of signals but which, by all accounts, were not really difficult.

Failure of this driver and his fireman to hear the detonators also may have been due to lack of alertness, but the results of the special runs referred to above have to be borne in mind in considering that. Full responsibility for the accident must rest on the driver, although Colonel Wilson is not satisfied that he received all the assistance he might have expected from his fireman. Stated to be steady and conscientious, his record is fair but his general outlook did not strike Colonel Wilson as particularly alert or receptive. His knowledge of the road is thought to have been adequate but his experience in driving fast trains was limited and he may not have appreciated the degree of vigilance required for express running in the particular weather conditions.

Remarks and Recommendations

The collision was brought about by one of those types of unpredictable human failure for which the safeguard of automatic train control has been designed but the engine of this express was not fitted with receiving apparatus. The British Transport Commission received formal approval from the Minister of Transport & Civil Aviation to its system towards the end of last year after long continued trials and since has been going ahead with plans to provide equipment on all main traffic routes as quickly as possible. The intention is to equip more than 1,300 miles of route and 10,000 motive power units by the end of 1962, first priority being given to the East Coast route to Scotland, which passes through Welwyn Garden City, and its locomotives. (As already explained all up and down main distant signals as far as Grantham are already fitted with track magnets.)

Although Colonel Wilson was satisfied regarding the reliability of the outer distant signal and that it was in a good group of signals to see, with several distinctive landmarks nearby by which to locate it, as it had been the object of discussion and possibly suspicion among engine crews, particularly from one depot, he discussed this aspect of the case with the Regional officers and, as a practical step to re-establishing the confidence of the men the group has been replaced by a multi-aspect colour-light with junction indicator and completely modernised controls, to be incorporated eventually in a comprehensive scheme. He sees no reason to criticise the inner distant installed in September, 1956, for there are many examples of such elsewhere. It was evi-

dent, however, that a good many drivers considered it misleading and it has been removed.

Suggestions were received from the public that it was wrong now to rely on "old fashioned" detonators in emergencies of this kind and that it would be better to use Very lights in signalboxes or electric signal lamps with narrow concentrated beam which could be "aimed" at a train and have a better chance than an ordinary hand lamp of attracting the attention of enginemen, guards, or even passengers. Colonel Wilson appreciates the intention of these suggestions and discussed them with railway officers. The detonator as an emergency warning has, however, stood the test of time on nearly all the railways of the world and on many occasions has saved the situation at the last moment. A great deal has been done, especially in recent years, to provide elaborate and very costly equipment—track circuiting of all kinds, special controls to guard against signalmen's errors, and A.T.C. to guard against driver's mistakes—and he does not consider there is any need to provide additional warning equipment in signalboxes in the hope that it might serve to attract attention on the rare occasions when detonators are not heard on the footplate.

It is not clear, however, why only half the normal charge is used in signalbox machines. Sound of the explosion is by no means startling on a fast running steam locomotive and the matter should be reviewed on an all line basis, taking all forms of motive power into consideration. Colonel Wilson feels that risk to staff on the ground from the explosion of a heavier charge in rare emergencies should not receive undue weight and that both 6½ in. and 3 in. between detonators in machines are unsatisfactory, owing to the risk of the first explosion removing the second detonator from the rails. This point also should have consideration.

Probably casualties would have been less serious had the last coach of the local train had its brake compartment in rear; standing instructions require this, where practicable. After special investigation the Operating Superintendent concluded that there had been opportunities to restore the proper marshalling of this set train location after the Christmas holiday abnormal stock working and has issued an appropriate reminder to all Districts in the Eastern Region and arranged for checks by supervisory staff. Marshalling brake compartments at the extreme front and rear of passenger trains is a very sensible precaution but may be overlooked especially when regular formations have been disturbed. It may be desirable to remind other Regions of its importance.

New Processes at Lloyds (Burton) Limited Works

In association with the American Brake Shoe Company, Lloyds (Burton) Limited, is introducing new processes at its Wellington Works. These will add a new series of alloy steels and irons to the present range of production.

To accommodate the equipment, an extension to the works, covering some 100,000 sq. ft., has been built at a cost of £500,000. Techniques developed by the American Brake Shoe Company are now used by the British firm, and information on processes has been exchanged.

Advanced techniques are being used in the production of cast components for railways, aircraft, and for general engineering use. In the new alloy steels there is a range of alloys for use in components required to operate in high temperatures and a range for components required to have maximum resistance to abrasion and wear.

The finished castings are annealed, hardened, and tempered according to the precise material specification and application requirements.

In the high-temperature alloy range, known as Lloyds Thermalloy, 10 mixes are offered, ranging from 65 per cent nickel and 18 per cent chrome, to 27 per cent chrome and 3 per cent. nickel.

Mechanised Equipment

In planning and operation of the new foundry, a considerable measure of flow production has been achieved by the maximum use of mechanised equipment and instrumentation for processing and handling.

Modernisation at Enfield Town

Work on the modernisation of Enfield Town station, announced in January last, is making good progress. The widening of platforms Nos. 1 and 2 is well in hand and work on the new station buildings is progressing well. The station buildings will be finished in a brownish red facing brick relieved on the rear side, abutting the platforms, by panels of contrasting tiling under the larger windows. The front elevation will incorporate a number of poster panels edged with a black tile surround. The roof will be of pre-fabricated timber construction and will be flat. The interior of the public portion of the buildings will be plastered and in the booking hall the plaster will be finished with a cement glaze. Elsewhere, use will be made of ordinary matt or gloss paint. Floors will be of linoleum or concrete, or quarry tiles, except in the booking hall, where terrazzo is to be used.

Good Lighting

Good natural lighting will be ensured by the use of dome lights projecting above the level of the flat roof, and these will incorporate a device affording permanent enforced ventilation. On all four walls of the booking hall, a clerestory—a gallery of windows immediately beneath the ceiling—will give ample natural light in conjunction with the fully glazed entrance doors. Artificial lighting will be ample and in conformity with the highest of modern standards.

Passenger accommodation will be bright and modern in styling and the furniture will be of the new standard pattern designed specially for the Eastern Region. The ladies' room will be similar in effect—though much smaller—to the new ladies' room at Liverpool Street Station.

Power-Operated Signalbox at St. Pancras

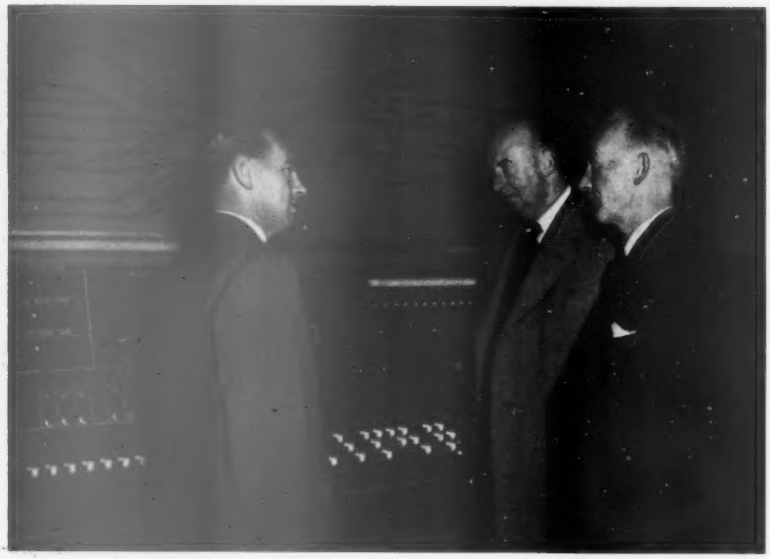
A new power-operated signalbox providing speedier movement of trains into and out of St. Pancras Station, London Midland Region, was placed in service on October 6.

This marks the completion of the resignalling of St. Pancras Station and its approaches and the introduction of colour-light signals and electro-pneumatic points.

The new box does the work of three former boxes and controls 23 colour-light signals, 43 position-light dwarf signals, and 36 route indicators. The operating console in the operating room is 13 ft. long and has 205 route switches, each operating a single route, and 33 point switches for individual operation in emergency. Behind the console is an illuminated track diagram covering the whole area controlled by the box. It is divided into 64 track circuit sections. The occupation of a section by a train or engine is indicated separately by two red lamps.

The signalbox building houses mess rooms for signalmen and linemen, a drying room and store, and a relay room

Widening work in progress on No. 1 platform, Enfield Town, Eastern Region, showing new concrete wall



Lord Rusholme, Chairman, London Midland Area Board (centre), inspecting the new St. Pancras signalbox, accompanied by Mr. David Blee, General Manager, London Midland Region, and (on left) Mr. W. J. Milligan, of the Signal Engineer's office

accommodating 1,400 relays. The adjacent power house contains main supply and distribution switchboards and a standby diesel generator.

Some of the new colour light signals are mounted on two large gantries outside the station. One is 55 ft. and the other 76 ft. wide. The larger gantry spans five running lines and a siding.

The main signalling contractors were the Westinghouse Brake & Signal Co. Ltd. The train describer equipment was supplied and installed by Standard Telephones & Cables Limited and the signalbox and power house were built by Chas. Booth & Son Ltd.

German Railway Officers' Tour

A party of 45 senior officers of the German Federal Railway, members of the Vereinigung der Regierungsbaumeister des Maschinenwesens (Motor) (V.R.M.) paid a visit last week as mentioned editorially in our issue of September 27, to British Railways' installations and to the works of various manufacturers of railway equipment.

The tour began on September 30 with a visit to the headquarters of the British Transport Commission, after which the party travelled by train to Stonebridge Park to see the British Railways' carriage-washing depot. On October 1 the party was entertained by J. Stone & Co. (Deptford) Ltd. and was shown that company's latest developments in air conditioning at Deptford. The party also visited the Crawley works of the company and saw train-lighting equipment being made.

Later in the week the party visited the Crewe works of British Railways and the Manchester-Sheffield electrified line. Other works seen by the party were those of the Yorkshire Engine Co. Ltd. at Meaden Hall and those of Metropolitan-Vickers Electrical Co. Ltd. at Attercliffe Common. On the Friday, the German officers went to the works of the North British Locomotive Co. Ltd. and then to the Forth Bridge.

The party was conducted by Mr. E. R. Brown, Works Manager (Locomotives), British Railways, Horwich.

Improving British Waterways

A programme of improvements costing some £1,500,000 for the Grand Union Canal between London and Berkhamsted was announced on October 8 by Sir Reginald Kerr, General Manager of British Transport Waterways. This is the last detailed programme to be announced under the British Transport Commission £5,500,000 development plan for their principal inland waterways, published in January, 1956, and which has already made considerable progress. The work to be done on the Grand Union Canal mainly comprises bank protection, the construction and enlargement of locks at Brentford; and an extensive dredging programme.

In a survey of the development plan as a whole Sir Reginald Kerr stated that substantial progress had already been made with the schemes previously announced. Cromwell Weir, on the River Trent, was half finished, and the work on the new large lock at Long Sandall, on the Sheffield & South Yorkshire Navigation, was proceeding well. The additional lock at Ponders End to accommodate the large barges on the Lea would be started almost immediately. All these three works should be completed next year. Designs and specifications for other new locks were well advanced, including hydraulically- and electrically-operated gates and sluices. Bank protection to the extent of some £500,000 was in hand and much of the dredging and other plant had been ordered. In all, work put in hand totalled over £1,500,000.

Sir Reginald was speaking at a British Waterways display of craft and equipment which has been assembled at Paddington Canal Junction, London, from October 8 to 11, for the benefit of waterways traders.

Staff and Labour Matters

Manning of Diesel Locomotives

A further meeting was held in London on October 7, between representatives of the B.T.C. and of the A.S.L.E.F. and N.U.R. to discuss the proposals which have been under examination for the manning of diesel and electric locomotives on British Railways. Progress was made on certain points of principle.

German railway officers at J. Stone & Co. (Deptford) Ltd. works showing (front row left to right) Mr. A. H. Chilton, Director, J. Stone & Co. (Holdings) Ltd.; Abt. Pr. Dipl. Ing. Harres, leader of the party; and Mr. W. J. Ruston, Sales Director J. Stone & Co. (Deptford) Ltd. Mr. Ellis R. Brown is between Dr. Harres and Mr. Ruston

Contracts and Tenders

Bogie wagons for Rhodesia Railways

Rhodesian Railways have placed an order for 500 bogie high-sided wagons with Dorman Long (S.A.) Limited, of Germiston, South Africa. Deliveries will commence in July, 1958, and are expected to be completed by August, 1959. An order for a similar quantity of these wagons recently received by Metropolitan Cammell Carriage & Wagon Co. Ltd. was reported last week.

British Transport Commission, South Wales Docks, has placed the following contracts:—

Scottish Cables, Limited: Supply and delivery of L.T. cable for renewal of crane services, South Quay, Newport Docks

Aberdare Cables Limited: Supply and delivery of L.T. cable and joint boxes for installation of electric capstans, South Quay, Newport Docks.

British Railways, Southern Region, have placed the following contracts:—

W. H. Gaze & Sons, Limited, London, S.W.15: resurfacing and surface dressing of footpaths and platforms, Woking District

Aubrey Watson, Limited, London, S.W.1: new workshop and improvements to existing workshop, Nine Elms

James Longley & Co. Ltd., Crawley, Sussex: new station, Gatwick Airport

W. R. Payne & Sons, Shipley, Yorks: renovations, Maidstone Barracks, Aylesford, New Hythe and Snodland Stations

E. H. Curd & Co. Ltd., Shoreham-by-Sea, Sussex: station improvements, Angmering

P. J. Hartel (Southern) Limited, Southampton, Hants: renovations, Millbrook Station

Samuel Butler & Co. Ltd., Stanningley, nr. Leeds, Yorks: reconstruction, Bramley Bridge over River Wey

Cleveland Bridge & Engineering Co. Ltd., London, S.W.1: extension of platforms, Charing Cross

Holloway Bros. (London) Limited, London, S.W.1: construction of electric loco. running shed and ancillary works, and construction of carriage cleaning and inspection shed, Stewarts Lane

L. & W. Whitehead Limited, London, S.W.9: reconstruction, Wimbledon Station

Maurice Hill Limited, Horndean, Hants: re-roofing of engine shed, Nine Elms Motive Power Depot

Taylor Woodrow Construction, Limited, Southall, Middx: reconstruction of roof, Eastleigh Carriage & Wagon Works

Brooks Air & Heat Systems Limited, London, W.C.2: installation of ventilation system, Lancing Works

C. & T. Painters Limited, London, N.W.10: renovations, Romsey Station

C. Isler & Co. Ltd., London, S.E.1: provision of new borehole and water supply, Yeovil Town Motive Power Depot

Aubrey Watson Limited, London, S.W.1: lengthening of platforms, extension of electrification, Kent Coast Area

Metallisation Limited, Dudley, Worcs: metal spraying of steelwork, Charing Cross Bridge

Deeds (Hounslow) Limited, Hounslow, Middx: renovations, Nine Elms Returned Empties Shed

Richard Costain Limited, London, S.E.1: layout and construction of new goods yard, Crawley

Askham & Palin, Limited, London, S.W.6: alterations to steel structures, extension of electrification

The Special Register Information Service, Export Services Branch, Board of Trade, has received calls for tenders as follows:—

From Nicaragua

10 flat wagons.

No set closing date has been given, but offers are required as speedily as possible. Bids should be expressed in U.S. dollars Nicaraguan port and addressed to the Autoridal Portuaria de Corinto, Administracion General, Conrinto, Nicaragua. The Board of Trade reference is ESB/16041/57.

From India

652 rotary detectors, double wire (double wheel), complete with all parts

855 rotary detectors, double wire (single wheel), complete with all parts

1,070 facing point locks with plunger detection (D.W. economical type), complete with all parts

491 split stretcher bars for lock facing point F.P. 90 RFF BSS (D.W. economical type SA 3214)

1,244 D.W. point mechanisms (economical type)

293 double wire point mechanisms B.G. and M.G.

158 split stretcher bars for lock facing point F.P. 60 RFF BSS (D.W. economical type)

32 economical type point layouts (MG) to suit 60 lbs. RFF BSS rails with facing point lock and plunger detection (DW economical type).

The issuing authority is the Director General of Supplies and Disposals. The tender No. is WP2/4286/23/B/RC/POINTS. Bids should be sent to the Director General of Supplies and Disposals, Shahjahan Road, New Delhi. The closing date is October 25, 1957. The Board of Trade reference is ESB/23511/57.

5,208 signal arms, enamelled type, to various drawings and specifications.

The issuing authority is the Director General of Supplies and Disposals. The tender No. is WP2/4286/C/RC/4. Bids should be sent to the Director General of Supplies and Disposals, Shahjahan Road, New Delhi. The closing date is October 25, 1957. The Board of Trade reference is ESB/23512/57.

1,126 signal mechanisms to various drawings and specifications.

The issuing authority is the Director General of Supplies and Disposals. The tender No. is WP2/4286/C/RC/27. Bids should be sent to the Director General of Supplies and Disposals, Shahjahan Road, New Delhi. The closing date is October 31, 1957. The Board of Trade reference is ESB/23513/57.

3,906 counterweight levers to various drawings and specifications.

The issuing authority is the Director General of Supplies and Disposals. The tender No. is WP2/4286/C/RC/5. Bids should be sent to the Director General of Supplies and Disposals, Shahjahan Road, New Delhi. The closing date is October 29, 1957. The Board of Trade reference is ESB/23514/57.

From Portuguese East Africa

18,650 rails, 12 m., 30 kgs./m.

150 rails, 11.92 m., 30 kgs./m.

18,880 pairs of fishplates for 30 kgs./m. rails

75,200 rail bolts with spring washers for 30 kgs./m. rails

710,531 galvanized rail spikes

10 sets of points, complete, 1:9, left, for 30 kgs./m. rails

8 sets of points, complete, 1:9, right, for 30 kgs./m. rails.

A deposit must be made by tenderers as follows: rails, Esc: 6,000,000; fishplates, Esc: 30,000; rail bolts, Esc: 5,000; rail spikes, Esc: 65,000; and points, Esc: 16,000. The issuing authority is the Ports, Railways and Transport Department, Lourenço Marques. The tender No. is 16/57. The closing date is December 19, 1957. The Board of Trade reference is ESB/23714/57.

Further details regarding the above tenders, together with photo-copies of tender documents, can be obtained from the Branch (Lacon House, Theobalds Road, W.C.1).

GERMAN RAIL CRASH.—Ten people were killed and 30 injured when a train crashed in thick fog into the rear of another standing at Stuttgart-Bad Cannstatt Station, on October 2. The rear carriage of the stationary train was completely destroyed, and traffic on the line was blocked for more than five hours. A message of condolence has been sent to Dr. Oeftering, Chairman of the German Federal Railway, by Sir John Benstead, Deputy Chairman, British Transport Commission.

SUCCESSFUL DOUBLE-DRAUGHTING TRIALS.—As part of British Railways general programme of measures to increase the efficiency of steam locomotives, investigations have been carried out at Swindon into the application of double-draughting arrangements, using a double blast-pipe and double chimney, to one of the British Railways standard class "4" mixed-traffic 4-6-0 tender locomotives, No. 75029. Service tests with this modified locomotive were undertaken with particular regard to the lower grade fuel likely to become available in the future, and revealed that it was capable, with Blidworth grade 2B coal, of fully maintaining a steaming rate of 22,500 lb./hr. under all reasonable service conditions over a route with rising gradients of approximately 1 in 50. This represents more than a 50 per cent increase over the nominal rate for the class 4 engine, which is 14,000 lb./hr. The modified class 4 engine also performed satisfactorily on certain fast services normally scheduled to be worked by class 5 locomotives. It is proposed to fit all 80 locomotives (Nos. 75000-75079) of this class with the double-draughting arrangements, and to experiment similarly with one of the standard 2-10-0 freight locomotives.

Notes and News

English Electric Co. Ltd. Subsidiary.—The English Electric Co. Ltd. has registered a £A3,000,000 Australian subsidiary, the English Electric Company of Australia Proprietary. Previously the company has operated as a branch of the U.K. parent.

Second L.T.E. Prototype Lightweight Tube Train.—The second of the London Transport prototype lightweight tube trains, that built by Gloucester Railway Carriage & Wagon Co. Ltd., was placed in service on the Piccadilly Line on October 7. The first prototype, built by Metropolitan-Cammell Carriage & Wagon Co. Ltd., is already in service on the Piccadilly Line. Reference to this train was made in our issue of August 16.

West London Air Terminal in Service.—The air terminal built over part of the Cromwell Triangle on the District Line of London Transport, as described in our April 12 issue, was brought into service earlier this week. The nearest Underground station, Gloucester Road, on the District and Piccadilly Lines, is some 500 yd. away; it is understood that there is no intention at present of building a covered way to connect the station with the air terminal.

Final Changeover of Motive Power at Margam Steelworks.—A small ceremony was held recently to mark the final changeover of the use of steam to diesel locomotives of the Steel Division of the Steel Company of Wales Limited at the Abbey Works, Port Talbot. This occasion marked the completion of a gradual changeover to diesel motive units, which was started in 1948. At present 36 diesel locomotives are in operation and it is planned that this number will be increased to 41 by the end of 1958.

Withdrawal of Passenger Train Service from Thorington.—The Eastern Region of British Railways announces that from November 4 the passenger train service will be withdrawn from Thorington station. Passengers will be catered for at Great Bentley station and by the omnibus services operating in the area. Parcels and goods "sundries" traffic, at present handed in at Thorington station for despatch, or addressed there "to be called for," may be handed in at, or addressed to, Great Bentley station. A collection and delivery service will continue to be provided on Tuesdays, Thursdays, and Saturdays, subject to cartage charges where appropriate. Facilities for freight traffic in full wagon loads will continue to be available at Thorington station.

Dowty Group May Require More Capital.—In his report for the year ended March 31, Sir George Dowty, Chairman of the Dowty Group of companies, stated that because in recent years a great deal of capital expenditure has been for research and development, additional finance of a permanent nature may be required to provide further production facilities. As the result of increased production group profits rose from £1,495,191 to £1,651,580, and the tax free dividend is raised from 7½ per cent to 9 per cent. The annual general meeting will be held at Cheltenham, on October 28.

Progress with Rebuilding at Leytonstone.—Work on the rebuilding of Leytonstone High Road Station, Eastern Region, is progressing well, and the waiting rooms on the down side platform will shortly be available for use by the public. The new booking office will also be brought into use very soon. Work on the demolition of the old buildings on the up side has now started in preparation for the erection of a new general waiting room and new lavatories. By dealing with one platform at a time a minimum of inconvenience has been caused to passengers. Prefabrication of the new fronts for the arches on the station approach is going on away from the site, and they will be fixed in position in due course.

Facilities for Transport Students.—As an additional facility for transport students and research workers, the Historical Records Collection of the British Transport Commission at 66, Porchester Terrace, London, W.2, is to remain open for research purposes until 8.30 p.m. every Thursday on and from October 17, 1957. This extension is because of the increased use which is being made of the present late opening until 8.30 p.m. on Tuesdays, and its continuance depends upon the response. The hours of opening of the Archives repository will thus be: 9.30 a.m.-4.30 p.m. (8.30 p.m. Tuesdays and Thursdays); Saturday, 9.30 a.m.-11.30 a.m. Further information may be obtained from the Commission Archivist, Mr. L. C. Johnson, at the address given above. More than 5,000 enquiries have been made at the repository since the Commission collection of transport records was made accessible to the public in 1951.

Special Course for Steel Engineers.—Arrangements have been made for a special sandwich course in heavy metallurgical works engineering suitable for the steel industry at Loughborough College of Technology, by the British Iron & Steel Federation. A minimum number of nominations has been guaranteed by several steel manufacturers to ensure a sufficient number of students to warrant the running of such a course. The first students will be enrolled at the college next January.

Silentbloc Annual General Meeting.—The twenty-second annual general meeting of Silentbloc Limited was held in London on October 4. The chairman, Mr. B. H. Dulanty, in his statement, referred to the unfavourable effect of strikes in the motor industry on the year's operations. As reported in our issue of September 27, gross profit for 1956-57 are some 20 per cent lower than on last year. He also announced that the company has secured the right to manufacture a revolutionary form of suspension for motor cars and heavy vehicles which might well have far reaching effects on its future prosperity.

New C.I.E. Branch at Limerick.—In contrast with the closure of extensive sections of railway in other parts of Ireland was the opening, on October 1, of a new branch of Coras Iompair Eireann at Limerick. This line, three miles long, connects the factory of Cement Limited, at Mungret, with the main line at Limerick Station. It is single track throughout, with sidings at the factory, and is used for the carriage of cement in special wagons. Construction began in the autumn of last year, and the works included 20,000 cu. yd. of excavation, several culverts, and two gated level crossings.

New Company at Dundalk Works, G.N.R.—The threatened redundancy of some 1,000 workers at the Dundalk Works of the Great Northern Railway has been averted by the decision of the Government of the Republic of Ireland to establish a new company, the Dundalk Engineering Works Limited. This is to undertake general engineering work at Dundalk. An arrangement has been negotiated under which the G.N.R. Board will lease the railway engineering works at Dundalk to the company, which will continue to undertake all the engineering work required by the G.N.R. on a basis that will involve no increased cost to the board.

Bus Surcharges in the Isle of Wight.—A scheme for surcharges on bus fares in the Isle of Wight during the four-month holiday season starting in June each year has been approved by the Traffic Commissioners. The plan, sponsored by the county council and all district councils in

Extension to Superheater Co. Ltd. Works at Trafford Park

The new buildings in the Superheater Co. Ltd. works at Trafford Park, Manchester (*see editorial reference in our issue of September* 27)

the island, was put before the Commissioners at Newport on September 17. The Southern Vectis Omnibus Co. Ltd., which operates services in the island, sought to raise fares to compensate for a recent wage award to busmen. The county council plan puts surcharges of 1d. on fares up to 6d., 2d. on fares between 7d. and 1s. 5d., and 3d. on fares of 1s. 6d. and over. It was stated that 60 extra buses were needed in the holiday season and that visitors and residents should provide the extra revenue needed to make services for the whole year pay. Fares are to be increased on a scale suggested by the bus company until the surcharge proposals can be brought into operation.

Road Casualties in August.—Casualties on the roads of Great Britain reached a peak in August when 531 people were killed and 6,581 seriously injured. In addition, 21,396 were slightly injured, making a total for all casualties of 28,508.

Gloucester Railway Carriage & Wagon Co. Ltd.—The report of the directors of the Gloucester Railway Carriage & Wagon Co. Ltd. for the year ended May 31, 1957, states that the trading profit of the group was £486,324, compared with £358,663 for the previous year. After adding income from investments and deducting depreciation and other debits, the group profit before taxation amounted to £437,592. After tax of £246,653, the net profit of the group was £199,357, of which the subsidiary companies have retained £30,984. Mr. W .D. Morgan, Chairman, states that the improved profit figures give cause for satisfaction and reflect a well-maintained level of production throughout the organisation.

Slip Group Sales in South America.—Fuel oil additives are used extensively in South America, but until six weeks ago none had been bought from Britain. Baron Rolf Beck, Chairman of the Slip group of companies, reports that as a result of his recent tour this has now changed. He visited 14 countries, from Mexico to Uruguay, and set up a technical sales organisation in each. The company has already received orders from every one of these new agencies totalling well over $250,000. "I am convinced," Baron Beck stated last week, "that Britain can only earn her share of this vast and growing market by personal contact. It is certainly worth the trouble." Among potential customers are railways using diesel traction.

British Railways Staff Association.—The membership of the British Railways Staff Association, which now exceeds 124,000, is the highest figure reached since the Association was formed in 1952. There are now 413 branches, enabling activities of the association to be extended in all Regions, and a wider choice of cultural and sporting events programmed for both summer and winter. The concluding inter-Regional events of the present season are: swimming competition at Kilmarnock Public Baths, Scottish Region, October 17; arts and crafts exhibition at Brunswick House, Vauxhall Station, London, Southern Region, November 11-13; table tennis at York Railway Institute, North Eastern Region, November 25-26.

Lubrication Conference Visit to Esso Research Centre.—One of the visits arranged by the Conference on Lubrication and Wear held in London, on October 1-3, as mentioned in last week's issue, was to the laboratories of Esso Research Limited at Abingdon, Berks. These laboratories envisage technical problems peculiar to the European, North African, and Middle Eastern areas; the other main research centre of the Standard Oil Group of companies is at Linden, near New York, and full interchange of information between the two is maintained. The existing facilities at Abingdon are being expanded; recently a new engine-test laboratory has been opened enabling product quality of fuels and lubricants to be assessed for multi-cylinder engines up to 200 h.p., as well as hypoid and spur gears, special bearings, and so on.

United Railways of the Havana & Regla Warehouses Limited.—Mr. Justice Wynn-Parry began the hearing in the Chancery Division, on October 8, of an application by the First Pennsylvania Banking & Trust Company, of Philadelphia, seeking to reverse the liquidators' rejection of a proof submitted by the company in the voluntary winding-up of the English operated United Railways of the Havana & Regla Warehouses Limited. The liquidators rejected applicant's proof for sums of £264,076; £11,177; £20,000; and £1,480,570.

Western Region Firefighting Competition.—Railway firefighters from all parts of the Western Region of British Railways will decide the finals of the Regional fire drill competitions, in London on October 15. The competition consists of 111 teams from stations, goods depots, and other railway installations who have taken part in the district competitions, 19 of which will now engage in the final contest, which will also decide the Western Region teams to take part in the British Railways inter-Regional competition to be held later.

Ransome & Marles Bearing Co. Ltd.—Mr. E. W. Senior, Chairman of Ransomes & Marles Bearing Co. Ltd., states in his annual review that while the order book is lower than it was a year ago, it is in a very satisfactory state; turnover is higher and the engineering industry, particularly the motor industry, is more buoyant. Consequently the present indications are that the company may look forward with cautious optimism to the current year. Group trading profits for the year ended June 30, were £1,315,345 against £1,224,251 for 1955-56, and, after tax of £550,952 (£489,592) and depreciation of £325,214 (£309,547), net profit was £411,905 compared with £400,132. The dividend is maintained at 15 per cent, absorbing £172,500.

New Refreshment Room at Inverness.—A refreshment room including a cafeteria, licensed bar and lounge was opened at Inverness Station on October 7. The accommodation, which has direct access to the station concourse, replaces the former refreshment room, and has been built as part of the modernisation and improvement programme that is being carried out by British Transport Hotels & Catering Services. Full use has been made of colour, modern materials, and the latest catering and refrigerating equipment. The refreshment room is approximately 46 ft. wide by 34 ft. deep and has a terrazzo facade, with large windows and double swing doors glazed in unbreakable glass, at either side. The room is divided into two sections of which the major portion forms the cafeteria. This has plastic lined walls, with random black terrazzo flooring and is furnished with tables covered with check patterned plastic, and plastic upholstered chairs. The main lighting throughout is by Laylight cluster fittings.

Visitors to Britain During August.—Figures issued by the British Travel & Holidays Association show that more than 180,000 overseas visitors came to Britain during August, an increase of nine per cent over the total for August last year. There were 102,000 visitors from European countries, 14 per cent more than in August, 1956. Countries which recorded large increases included Italy, with 39 per cent; France, 15 per cent; Holland, 12 per cent; and Germany, 10 per cent. Visitors from the United States decreased by two per cent, from 42,500 to 41,900, compared with August last year, but the total number of American visitors in the first eight months of this year was slightly higher than the total for the corresponding period of 1956.

British Railways International Ambulance Competition.—At the British Railways annual international ambulance competition held in Glasgow on October 3 at the St. Andrews Ambulance Association Headquarters, Glasgow, England with an aggregate of 1,633½ points, beat Scotland, with 1,426 points. The highest individual English team score was Southampton Docks S.M.E., with 351 points, and the highest Scottish score was 319½ points by Motherwell. Mr. James Ness, General Manager, Scottish Region, British Railways, presided, and the prizes were presented by Mrs. Ness. During his remarks, Mr. Ness appealed to the younger members of the staff to come forward and support the first aid movement. Mr. C. H. Brazier, Director of Industrial Relations, British Transport Commission, London, and Mr. D. F. Gowen, Regional Establishment & Staff Officer, Scottish Region, proposed votes of thanks.

Forthcoming Meetings

Open currently and until further notice.—British Transport Commission: Historical Exhibition "Transport Treasures" in Shareholders' Meeting Room, Euston Station, from 10 a.m. to 6 p.m. on weekdays, and 2 to 6 p.m. on Sundays. Admission 6d.

October 12 (*Sat.*).—Permanent Way Institution, Manchester & Liverpool Section, at the Manchester College of Technology, Sackville Street, Manchester, at 2.30 p.m. Talk on "The work of the B.T.C. mining service," by Mr. M. Fletcher.

October 14 (*Mon.*).—Railway Correspondence and Travel Society, Northampton Branch, at the Liberal Club, Castilian Street, Northampton, at 7.30 p.m. Paper on "The Locomotives of F. W. Webb," by Mr. J. F. Clay.

October 14 (*Mon.*).—Institute of Transport, at 66, Portland Place, London, W.1., at 5.45 for 6.15 p.m. at Jarvis Hall, 66, Portland Place, London, W.1. Presidential Address by Sir Reginald H. Wilson.

October 15 (*Tue.*).—Institute of Transport, Scottish Section, at 46, Bath Street, Glasgow, at 7.30 p.m. Paper on "Roller bearings in transport," by Mr. W. W. Watkins, manager, Scottish area, Skefko Ball Bearing Co. Ltd.

October 16 (*Wed.*).—British Railways (Southern Region) Lecture & Debating Society, in the Chapter House, St.

Thomas's Street, S.E.1, at 6 p.m. Paper on "Freight rolling stock," by Mr. A. H. J. Turner. In the chair, Mr. H. B. Taylor.

October 17 (*Thu.*).—Railway Correspondence & Travel Society, Lancashire & North West Branch, at All Saints Rectory, Droylsden Road, Newton Heath, Manchester, 10, at 7 p.m. Messrs. D. R. Smith and J. F. Oxley on "The Cambrian Railways."

October 17 (*Thu.*).—British Railways (Western Region) London Lecture & Debating Society, at Headquarters Staff Dining Club, Bishop's Bridge Road, Paddington, W.2, at 5.45 p.m. Paper on "The running of the track testing car on the Western Region," illustrated, by Mr. R. M. Hancock, Chief Experimental & Locomotive Testing Officer, London, and Mr. J. Rees, Chief Civil Engineer's office, Paddington.

October 18 (*Fri.*).—Railway Correspondence & Travel Society, London Branch, at the Railway Clearing House, Eversholt Street, N.W.1, at 7.15 p.m. Paper on "A railway holiday in Russia," illustrated by lantern slides, by Mr. J. H. Price.

October 18 (*Fri.*).—Institute of Transport, Tees-side-Section, at the Cleveland Scientific & Technical Institution, Middlesbrough, at 7 p.m. Paper on "The contribution of railways to the industrial development of Tees-side" by Mr. K. A. Kindox.

October 18 (*Fri.*).—Institution of Mechanical Engineers, at 1, Birdcage Walk, Westminster, S.W.1, at 6 p.m. Presidential Address by Sir George Nelson.

October 19 (*Sat.*).—Permanent Way Institution, East Anglia Section, at Norwich at 2.15 p.m. Permanent way quiz.

October 19 (*Sat.*).—Railway Correspondence & Travel Society, South of England Branch, at the Y.M.C.A., Friar Street, Reading, at 6.30 p.m. Paper on "The railways of the Isle of Wight," by Mr. J. R. Fairman.

October 21 (*Mon.*).—Historical Model Railway Society, at the Headquarters of the Stephenson Locomotive Society, 32, Russell Road, London, W.14, at 7 p.m. Paper on "Goods rolling stock," by Mr. K. Vincent.

October 22 (*Tue.*).—Railway Correspondence & Travel Society, East Midlands Branch, at the N.C.S. Guild Room, Toll Street, Nottingham, at 7.30 p.m. Paper on "The London extension of the Midland Railway," by Mr. S. Summerson.

October 22 (*Tue.*).—Institute of Transport, visual aids meeting, at 80, Portland Place, London, W.1, at 6.15 p.m. "Diesels afloat," and "The diesel on rail."

October 23 (*Wed.*).—Railway Students' Association, at the London School of Economics & Political Science, Houghton Street, W.C.2, at 6,30 p.m. Presidential Address by Mr. A. H. Grainger, Deputy Chairman, London Transport Executive. Mr. J. W. Watkins, retiring President, in the chair.

October 23 (*Wed.*).—Permanent Way Institution, London Section, at the Headquarters of the British Transport Commission, 222, Marylebone Road, London, N.W.1, at 6.30 p.m. Paper on "My visit as a sub-gauger to the German State Railways," by Mr. A. Easterbrook.

October 23 (*Wed.*).—Institution of Locomotive Engineers, at the Institution of Mechanical Engineers, 1, Birdcage Walk, London, S.W.1, at 5.30 p.m. Paper on "Modern battery railcars," by Dr. Ing. G. Wilke.

October 24 (*Thur.*).—The Railway Club, at 6.45 p.m. Performance of railway films in the Film Theatre of the British Council, 3, Hanover Street, London, W.1, for members and their guests.

October 24 (*Thu.*).—Institution of Electrical Engineers, at Savoy Place, London, W.C.2, at 5,30 p.m. Lecture on "The post-war electrification of the Polish State Railways," by Mr. J. Podoski.

October 24 (*Thu.*).—Institution of Mechanical Engineers, at 1, Birdcage Walk, Westminster, S.W.1, at 6.45 p.m. Discussion on: "Diagnosis of causes of ball and roller bearing lubrication failures."

Railway Stock Market

Despite the strength developed by the £ in relation to the dollar and leading European currencies, stock markets displayed considerable uncertainty at the beginning of the week. This was largely because it is now more widely recognised that the 7 per cent Bank rate and the tightening of the credit squeeze are not merely a temporary development which will be relaxed because the £ has found renewed strength. These measures are important checks to inflation, and as such essential if confidence in the £ is to be maintained. The tendency has been for British Funds to strengthen, but industrial shares moved lower. There is the fact that in existing conditions there is not much scope for higher dividends. In addition, sentiment is affected by the knowledge that over the next six months a flood of new issues is in prospect from leading oil and industrial companies, which will absorb the bulk of investment money and tend to keep markets quiet.

Foreign rails came in for very little demand and price movements in this section were small and indefinite. Antofagasta ordinary stock eased from 28½ to 27½, but the preference stock was fractionally higher on balance at 41½. Yield on the ordinary stock is now over 14 per cent on the basis of last year's 4 per cent dividend.

United of Havana second income stock has strengthened to 8⅝. San Paulo Railway 3s. units were again 2s. 4½d. Mexican Central "A" bearer debentures kept at the lower level of 67 recorded a week ago. Brazil Railway bonds kept at 6. Chilean Northern 5 per cent debentures were 38½ and Costa Rica ordinary stock 19, while Dorada ordinary stock was quoted at 67½ and Guayaquil & Quito assented bonds at 77.

International of Central America common shares kept at $23½ and Taltal shares were 13s. 9d.

Canadian Pacifics again reflected Wall Street and were $57¼, compared with $59¼ a week ago, and are now at their lowest this year. Their peak level this year was $75½. The big fluctuation represented by these extreme prices indicates the sharp advance earlier this year in Wall Street markets and the subsequent reaction. Dollar stocks have a reputation for fluctuations, but there is no doubt as to the sound position of Canadian Pacific, which is well placed to benefit from further expansion of the Canadian economy. At the moment, however, sentiment is affected by fears that there may be a temporary business recession in the U.S.A., which, if it developed, could for a while slow down Canadian and world trade. White Pass shares were $17½, as compared with $17¼ a week ago.

In other directions, Nyasaland Railways shares were again quoted at 10s. with the 3½ per cent debentures at 52.

The shares of locomotive builders and engineers moved generally lower on balance because of the downward trend in stock markets, but Gloucester Wagon 10s. shares were again helped by the good financial results, and at 15s. 9d. were within 3d. of the level ruling a week ago. Wagon Repairs 5s. shares eased from 12s. 7½d. to 12s. 4½d. and Beyer, Peacock 5s. shares lost 3d. at 8s. 4½d.

Hurst Nelson remained at 28s. to which they moved down a week ago, but there was a further rally from 12s. 3d. to 13s. in North British Locomotive. On the other hand, Birmingham Carriage receded further from 17s. 6d. to 17s. Helped by the interim dividend, G. D. Peters kept at 26s. 3d.xd.

Associated Electrical were 52s. compared with 54s. a week ago, while English Electric fell from 55s. to 51s. 9d. and General Electric from 44s. 9d. to 41s. 6d. Shares of the Dowty Group rallied from 30s. to 30s. 6d., helped by the chairman's annual statement. Vickers' new shares were at a premium of 1½d. but the 6 per cent loan stock has been at a discount of 15s. Terms of the issue were, of course, fixed before the Bank rate increase, and 83 per cent of the stock was taken up by underwriters. Nevertheless, there is general confidence that as time proceeds the stock will command a satisfactory premium in the market.

OFFICIAL NOTICES

WORKING FOREMEN (Carriage and Wagon Maintenance) required by East African Railways and Harbours Administration for one tour of 36-45 months with prospect of permanency. Salary scale (including Inducement Pay) £863 rising to £968 a year. Commencing salary according to age. Outfit allowance £30. Free passages. Free quarters or an allowance in lieu. Liberal leave on full salary. Candidates, between 25 and 35, must have served an apprenticeship to Carriage and Wagon fitting with British Railways or a firm of carriage and wagon builders, preferably including some experience in the Lifting Shed. Subsequent experience of vehicle running with Carriage and Wagon examining staff, detecting and rectifying mechanical and power brake defects on vehicles in service, power brake testing, etc., and experience of Westinghouse Air Brake desirable.—Write to the Crown Agents, 4, Millbank, London, S.W.1. State age, name in block letters, full qualifications and experience and quote M2B/41618/RA.

APPLICATIONS are invited for the post of DIVISIONAL SIGNAL ENGINEER, PAKISTAN RAILWAYS. Contract for one year, extendable. Pay: Rs. 600-40-1,000-1,000-1,050-50/2-1,150, plus special pay Rs. 250/- per month. 1 Rupee = 1s. 6d. Higher start possible. Free second tourist Class sea passage for self and family on appointment and termination of contract. Qualifications: 1. Membership of Institution of Railway Signal Engineers (England) *or* equivalent. 2. Ten years' experience as Senior District Signal Engineer or equivalent post. 3. Apprenticeship with Railway Co. or Railway Signalling Manufacturing Co. 4. Experience in erection and installation of Mechanical and Electrical signalling apparatus. 5. Knowledge of selection and control circuit and table including electric locking. 6. Working knowledge of English. Maximum age: 50 years. No restriction on Nationality or Domicile.—Application forms and further particulars from the Recruitment Officer, Education Division, Pakistan High Commission, 39 Lowndes Square, London, S.W.1.

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